

Original Articles

STUDIES ON FEVERS DUE TO PARATYPHOID ORGANISMS AND BACT. ENTERITIDIS

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MANY of the salmonella organisms have been from time to time reported to give rise to disease in man. An editorial, *British Medical Journal* (1945), divides human salmonella infections into three clinical varieties, viz, paratyphoid fever, salmonella septicæmia and salmonella food poisoning. Bornstein (1943) holds almost the same view. Another editorial in the *British Medical Journal* (1946) comments: 'The septicæmic type of infection with salmonella strains appears to be on the increase in this country and this increase seems to be even more marked in India'. The literature in India about the description of various salmonella infections as diagnosed by isolation of the organism is scanty. Whatever there is refers mainly to the paratyphoid fever in the majority of cases due to *B. paratyphosum A*. Most of these reports are however confined to their incidence without any reference to their clinical features. Karunakaran and Pillai (1942) described 9 cases in 2 family outbreaks

of fever due to *B. paratyphosum A*. Wasti (1945) only recently has published the description of 9 cases of *B. paratyphosum C* fever where, with one exception, the diagnosis was made by isolation of the organism. Goyle and Shaikh (1943) described one case of enteric fever in a child due to *B. enteritidis*. This appears to us as the first published record in India of the invasive property of *B. enteritidis*. McDonald (quoted by Hayes and Freeman, 1945) described, in 1944, 3 cases of septicæmia caused by *B. enteritidis* occurring among Indian troops. *B. paratyphosum B* has received very little attention except an occasional passing reference to its rare incidence. Thus, Seshadrinathan and Pai (1940) isolated *B. paratyphosum B* from 3 cases. Karunakaran and Pillai isolated it from the stool of a patient from whose blood *B. typhosum* was grown. Minehin (1939) got 2 cases of *B. paratyphosum B* but he did not mention whether the diagnosis was based on culture or agglutination reaction. Hayes and Freeman (1945) isolated it only 7 times in a series of 548 salmonella infections.

In our series table I and the following account summarize the clinical and related features of 10 cases of *B. paratyphosum A*, 6 cases of *B. paratyphosum B*, 15 cases of *B. paratyphosum C* and 12 of *B. enteritidis*. In all these cases the corresponding salmonella has been isolated from the blood with the exception of one *B. paratyphosum C* which was isolated only from the stool and another of *B. enteritidis* that was isolated only from the pus.

Bact. paratyphosum A

Altogether 10 cases have been studied. Of these, 4 ran an uncomplicated course lasting from 9 to 15 days. Toxæmia was slight. Maximum temperature was 103°F. One case came with all the signs and symptoms of typical pneumonia.

TABLE I

					<i>B. para A</i>	<i>B. para B</i>	<i>B. para C</i>	<i>B. enteritidis</i>	Bracket fatal.
Number of cases studied					10	6	15	12	
Clinical course :									
With recovery—									
(i) Short (2 weeks)					5	2	3	4	
(ii) Long (more than 2 weeks)					3	0	6	2	
With death					2	4	6	6	
Age—									
0-15					1	1	3 (1)	2	
16-30					9 (2)	5 (4)	10 (5)	10 (6)	
31-40					0	0	2	0	
Sex—									
Male					10	5	14	10	
Female					0	1	1	2	
Religion—									
Hindu					6	2	10	5	
Muslim					4	4	5	6	
Christian					0	0	0	1	

Only tympanitis and caecal gurgling were very prominent in this case. The temperature was controlled by the administration of M. & B. 693 on the 9th day. In 2 cases fever lasted up to the end of the 3rd week. Another had a peculiar course in that the temperature was remittent up to the 5th day and then continued intermittently up to the 40th day, the highest temperature in these 3 cases being 103°F. The other 2 cases which became fatal were cases of relapse after an apyrexial period of 2 days. Both had pulmonary complications, viz, bronchitis and right lobar pneumonia respectively in their primary course. During the relapse, one developed bronchopneumonia and the other lobar pneumonia again. The primary fever in both was of longer duration, viz, 25 and 33 days respectively. It is curious that both of them died on the 19th day of relapse.

Other features.—Constipation in 4 cases. Diarrhoea in 3 cases. Cough in 3 cases apart from the 3 who developed pneumonia. Bradycardia in 4 cases. Spleen was enlarged in 8 cases and liver in 4. Rose spots were noted in one case on the 11th day of the disease.

Blood examination :—

	TOTAL LEUCOCYTE COUNT PER C.M.M. OF BLOOD			
	Below 5,000	Between 5,001-7,000	Between 7,001-10,000	Above 10,000
Number of cases.	1	3	3	3

Blood culture.—Positive in the 1st week—3 cases; positive in the 2nd week—6 cases; positive in the 3rd week—one case only.

Agglutination reaction.—In 4 cases it was positive to AH; 1 in 50 in 2 and 1 in 83 in 2. The days of illness in which such positive reaction was obtained were 7, 11, 15, 17. The sera of 3 of these positive cases were also positive either to BO or TO and BO in 1 in 25 dilution. The remaining cases were all negative to TH, TO, AH, BH and BO in all dilutions.

Bact. paratyphosum B

Altogether 6 cases have been studied. Four cases died on the 8th, 9th, 12th and 13th days respectively. All these had high fever (103°F. to 105°F.) with marked toxæmia and stuporose condition which were followed by typical typhoid state and death. The first case developed bronchopneumonia over which circulatory failure supervened and carried away the patient. The second case was afebrile for one day only, death occurring from acute cardiac failure. The third case was interesting in that the temperature was typically septicæmic in type with daily intermissions and evening rise to 103°F. to 104°F. The fourth case followed a

classical enteric course, death occurring from toxæmia and circulatory failure. The other 2 cases were of short duration, 12 days in one and a little over two weeks in the other.

Other features.—Diarrhoea in 2 cases; constipation in 2; bradycardia in 1. Liver was palpable in 3 and spleen in 5. No rose spots were seen in any one.

Blood changes.—Leucocytes—between 5,000 to 7,000 per c.mm. in 2; 7,001 to 10,000 in 3; above 10,000 in 1.

Blood culture.—Positive in the first week in 2 and in the second week in 4 cases.

Agglutination reactions.—BH was positive in one case on the 7th day, to a dilution of 1 in 125. BH and BO were negative in 5 cases but of these cases TH and TO were positive 1 in 50 in one and, in another, TH was positive 1 in 25 only.

Bact. paratyphosum C

Fifteen cases have been studied of which 6 were fatal. Two cases died of perforation. One of these had diarrhoea at the beginning, perforation having occurred on the 18th day. The other developed diarrhoea during the course and died of perforation on the 32nd day. Two cases died of severe toxæmia and circulatory failure on the 11th and 13th days. Two others had pulmonary complications. Nine cases survived. In one of these cases, the termination of the enteric fever could not be defined owing to the development of pleural effusion. All the 6 cases which continued their course beyond the second week had severe toxæmia. The rest finished their course within two weeks and did not show marked toxæmia. The temperature, in all the cases, was of a continuous or remittent type, the highest varying between 103°F. and 105°F. One case had hyperpyrexia, the fever shooting up to 106°F.

Other features.—Three had onset with chill and rigor; 3 had constipation and 2 diarrhoea. Pulmonary involvement was found in 3 cases; bleeding from the gums in one case, epistaxis in 1 and bradycardia in 1. Liver was enlarged in 5 cases and spleen in 11. Rose spots appeared in one case on the 16th day of the disease. Complications were frequent. Besides bronchitis and bronchopneumonia, hæmorrhage occurred in 1 and perforation in 2 cases both of which terminated fatally. One developed a nervous complication characterized by slurring speech and paresis of both the limbs, these conditions being progressive during convalescence. He had also suppuration in the right thigh at the site of an injection. One other case was complicated by pleural effusion.

Blood changes.—Leucocytes—below 5,000 per c.mm. in 3 cases; between 5,001 to 7,000 in 6 cases; 7,001 to 10,000 in 4 cases and above 10,000 in 1. One case showed progressive leucopenia from 9,680 to 4,375 per c.mm. on the 18th day.

Culture.—Positive in the first week in 2 cases and in the second week in 13 cases. In one of these cases, *B. paratyphosum C* was isolated twice from the blood. In the case in which nervous manifestations and suppuration took place, the organism could be isolated from the blood on the 9th day, urine on the 30th day, stool on the 42nd day and from the pus on the 45th day of the illness. In another case, the organism was isolated from the diarrhoeic stool only.

Agglutination reaction.—In 3 cases it was positive to CH only, 1 in 50 on the 15th day, 1 in 250 on the 19th day and in the 3rd case 1 in 250 on the 32nd day. In 2 cases, the serum reactions were all negative on the 9th day but later on TH became positive in one, 1 in 125 on the 16th day and in another 1 in 250 on the 31st day. Other cases were negative to all.

B. enteritidis

Altogether 12 cases have been studied and of these 6 were fatal. All the patients had continuous fever and marked toxæmia often merging into coma and delirium. The 6 fatal cases died on the 13th, 9th, 7th, 15th, 12th and 7th day respectively. The first of these cases died of toxæmia and circulatory failure. The next 2 cases were complicated by hyperpyrexia which could not be controlled. One of these latter had severe epistaxis and bouts of hæmoptysis before death.

The 4th case was associated with severe anaemia, the hæmoglobin being less than 30 per cent or 4.26 gm. per cent. The 5th case was complicated by pneumonia while the last one which had splenomegaly with positive aldehyde and Chopra's test developed fatal bronchopneumonia. In 4 cases which recovered fever was not of long duration, having lasted for 9, 9, 11, and 12 days respectively, although the height of the temperature and toxæmia were comparable to those of the more severe cases. Only one of these showed signs of pulmonary involvement. In one case the temperature and duration of the illness were like those of typical

typhoid fever. While convalescing this patient developed bilateral gluteal abscess. The pus from these contained *B. enteritidis*. In the last case, after a course of continuous fever for 10 days, the temperature touched normal. This was subsequently followed by irregular intermittent fever up to the 37th day. It was found that the patient had developed an abscess in the right gluteal region at the site of a quinine injection which was given to him before he came into the hospital. The diagnosis of this case was based on the isolation of the causative organism only from the pus.

Other features.—Constipation in 5 cases; diarrhoea in 1; bradycardia in 5; enlargement of the liver in 9 and that of the spleen in 10 cases.

Blood changes.—Leucocytes—below 5,000 per c.mm. in 1 case; between 5,001 to 7,000 in 7; 7,001 to 10,000 in 3 cases.

Culture.—Eight cases were positive in the first week, 2 in the second week and 1 in the third week.

Agglutination reaction.—Eight cases were negative to the group. The blood serum of one case, which was negative on the 17th day, became positive to TO on the 24th day in 1 in 125 dilution. In another case, the serum though positive to TO on the 7th day in 1 in 83 dilution, was negative to *B. enteritidis*. In two other cases, the serum agglutinated with TO, TH and AH in varying titres but failed to show any reaction with *B. enteritidis*.

Table II and the graph compare the monthly incidences of *B. typhosum* and the various salmonellas during the three-year period 1943 to 1945. It may be noted that while the latter were distributed more or less uniformly throughout the year, *B. typhosum* showed a definite seasonal rise with its peak in August.

Table III shows the number of cases from which *B. typhosum* and other salmonellas were isolated in the Calcutta Medical College Hospitals during the two five-year periods between 1936 to 1946 and the percentage incidences of *B. typhosum* and *B. paratyphosum A*. It also compares the corresponding figures as

TABLE II

Seasonal incidence of the different enteric infections during the three years from 1943 to 1945

Month	Total <i>B. typhosum</i>	Total <i>B. para A</i>	Total <i>B. para B</i>	Total <i>B. para C</i>	Total <i>B. enteritidis</i>	Total paratyphoid organisms and <i>B. enteritidis</i>
January	1	0	0	2	1	3
February	1	3	1	2	0	6
March	8	2	0	0	0	2
April	8	2	0	1	0	3
May	9	2	1	0	3	6
June	7	0	1	0	1	2
July	13	1	0	2	3	4
August	21	0	1	2	1	6
September	15	2	1	1	3	7
October	14	0	0	4	0	4
November	10	2	2	1	0	5
December	3	1	0	2	0	3

collected from the reports of observers all over India.

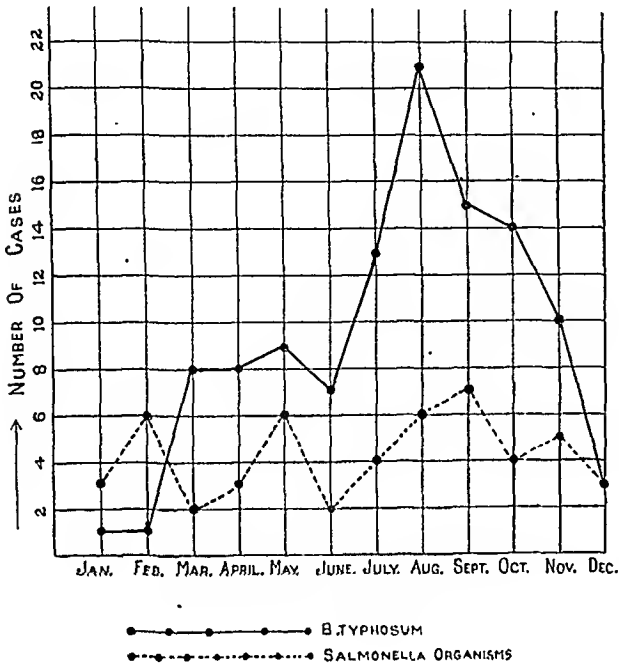


Table IV gives a more detailed account of the typhoid-salmonella organisms isolated in the Calcutta Medical College Hospitals since 1936.

It will appear that the figures in table I are often smaller than the corresponding figures in tables II, III and IV. This is due to the fact that only those cases whose clinical details were available have been selected for study and entered in table I.

Discussion

The cases described above had all been admitted into the Medical College Hospitals, Calcutta, with fever as their main complaint. The organisms were mostly isolated from the peripheral blood showing their invasive nature. There is a lingering belief amongst the profession that some members of the group are usually associated with acute bacterial food poisoning, that pathologically they remain localized to the intestinal tracts, that clinically there is acute gastro-enteritis with either clinical and bacteriological cure or death in a few days, and that epidemiologically they cause outbreaks in the majority of which infected animal food serves to convey the infection. It is also

TABLE III

	B. typhosum	Percentage of B. typhosum	B. para A	Percentage incidence of para A.	B. para B	B. para C	B. enteritidis	Other salmonellas	Year	Place
Soman (1934)	41	95.4	2	4.6	0	0	0	0	1936-38	Bombay.
Minchin (1939)	213	97.7	3*	1.3	2*	0	0	0	1936-38	Madras.
Karunakaran and Pillai (1942)	201	83.0	25	10.3	..	..	..	16	1940-41	Travancore.
Goyle and Shaikh (1946)	172	82.5	35	17.0	0	0	1	0	1942-44	Lahore.
Hayes and Freeman (1945)	1,299	70.3	281	15.2	7	110	111	39	1941-45	India.
Napier <i>et al.</i> (1942)	33	86.8	5	13.2	0	0	0	0	1938-41	Calcutta (Tropical School).
Chatterji (1942)	199	93.8	11	5.2	2	0	0	0	1936-39	Calcutta (Medical College).
Present series	269	94.3	14	5.0	2	0	0	0	1936-40	Do.
	203	75.9	26	9.7	8	18	12	0	1941-45	Do.

* Not noted whether diagnosis was based on culture or Widal.

TABLE IV.

Year	B. typhosum	B. para A	B. para B	B. para C	B. enteritidis
1936-39.					
Chatterji (1942)	199	11	2	0	0
1942	70	3	0	0	0
Total in 5 years, 1936-40	269	14	2	0	0
	(=94.3%)	(=5%)			
1941	45	5	0	0	0
1942	48	6	1	1	0
1943	49	7	3	8	0
1944	43	6	4	5	11
1945	18	2	0	4	1
Total in 5 years, 1941-45	203	26	8	18	12
	(=75.9%)	(=9.7%)			
1946 up to July	8	0	1	1	1

believed that next to *B. typhosum*, *B. paratyphosum A* produces more bacteraemia and general symptoms of fever and toxæmia whereas the *B. paratyphosum B* and *C* and *Bacillus enteritidis* produce less general reaction but more symptoms of localized infections, viz, nausea, vomiting and diarrhoea. In other words, the invasiveness of these organisms progressively diminishes as we come downwards from *B. typhosum* and it is likely to be the least in *Bacillus enteritidis*. From a study of our 43 cases, it will be apparent that the causative salmonella organisms instead of confining themselves and their activities to the intestinal tracts have become definitely invasive and found their way into the blood stream causing bacteraemia and toxæmia. It is obvious that the intestinal wall has failed to stop the aggression of the bacteria and their setting up of inside bases from which bacterial showers are constantly thrown into the circulation. When such showers are intermittent, the clinical picture is dominated by an irregular up and down temperature with toxæmia and resembles a septic fever. But when the bacteria flow into the circulation steadily and continuously, the clinical picture resembles a remittent or continuous temperature with varying degree of toxæmia as one may see in a severe case of typhoid fever. Only one of our cases conformed to the typical septic type. This was a case of *B. paratyphosum B*-infection in a young, otherwise healthy student, aged 21 years, showing typical septic type of intermittent fever with all the features of grave toxæmia. As far as we can gather, such a manifestation has not been reported with *B. paratyphosum B* infection but has been known in cases of *B. enteritidis* (Guthrie and Montgomery, 1939, also McDonald quoted by Hayes and Freeman, 1945). In the present series of cases, however, the writers could not find any septic type of fever in any of the 12 cases of *B. enteritidis* infection.

About the *B. paratyphosum A* infection, the most conspicuous feature is its mildness and its short duration in 50 per cent of the cases. The two fatal cases had both long primary fever followed by relapse and accompanied by grave pulmonary complications. In this connection, it is interesting to note that Karunakaran and Pillai (1942) reported no death among their 10 cases, nor did Goyle and Shaikh (1946) out of the 35 cases reported by them. When we come to *B. paratyphosum B* infection, the picture is reversed. Toxæmia and severity of symptoms were marked in most of the cases. In 17 cases reported by Parry (1942) diarrhoea was a prominent feature in 10. Topley and Wilson (1936) remark that *B. paratyphosum B* may excite marked gastro-enteritis during the course of the fever it produces. Hayes and Freeman (1945) quote Savage and also Feemster and Anderson to say that *B. paratyphosum B* infection may manifest itself as pure gastro-enteritis. No such features could be found by the writers

in their cases. *B. paratyphosum C* infection, contrary to the usual teaching of textbooks, is not so innocent. In the present series of 15 cases, only 3 were of short duration and associated with mild toxæmia but this fact is more than counterbalanced by 6 deaths, long duration and severity of toxæmia in the remaining cases and by the frequency and variety of complications, the most remarkable being perforation in 2 cases and progressive paralysis during convalescence in another. Wasti (1945) described 9 cases with 3 deaths. Complications were bronchopneumonia, M.T. malaria and arthritis. In his review of the literature *B. paratyphosum C* was found to have a marked suppurative tendency which however he did not meet with in any of his own cases. In the series under discussion, one developed an abscess from which the organisms were isolated.

All the cases of *B. enteritidis* infection were characterized by severe toxæmia regardless of the duration of the disease. Complications were hyperpyrexia in 2 cases, severe epistaxis and hæmoptysis in one and pneumonia in another. Hayes and Freeman (1945) contend that *B. enteritidis* septicaemia often culminates in suppuration. Gluteal suppuration developed in two out of our 12 cases while in the convalescent stage and another case (not included in the series, as full details of the case could not be obtained) admitted as enteric fever showed the organism in a sample of pus obtained from an abscess which had developed over the sternal region. Another feature is that though *B. enteritidis* is one of the classical organisms for acute gastro-enterocolitis, in none of our 12 cases of invasive type was there any indication of such symptoms. Only one had diarrhoea but as a symptom it has been found to be more common with the *B. typhosum* and other salmonella infection. It appears that the bacterium which is a true salmonella has during its process of evolution undergone complete mutation while acquiring the faculty of invading the blood stream and the body organs.

Widal reaction and blood culture.—In all our cases, diagnosis was based on isolation of the organisms, in one case from the stool, in another from pus and in the rest from the blood. In nearly 60 per cent of the cases, the blood culture was positive in the second week and in more than 4 per cent it was positive in the third week. This shows that we should not neglect blood culture in a suspected enteric case even though the disease has passed beyond the first week. The superiority of blood culture over the Widal reaction and in fact its indispensability is further proved by the fact that if we were left to diagnose the nature of the enteric fever by Widal reaction alone with the usual TAB suspensions we would have missed or misdiagnosed most of our cases. Many of the cases showed non-specific agglutinins even up to a considerably high titre. Although the possibility of mixed infection was there, they indicate the

difficulty of proper interpretation of the Widal reaction in these cases. Some of the enteritidis cases showed TO positive and TH negative. McDonald (quoted by Hayes and Freeman, 1945) also found 2 out of his 3 septicæmic cases positive to TO. Unless this possibility due to sharing of the same somatic antigen by *B. typhosum* and *B. enteritidis* is specially remembered, the cases are likely to pass off, in the absence of blood culture, as infection with *B. typhosum* where the flagellar antibody has failed to develop.

From the above it may be noted that many of the pyrexias seen in the hospital and also outside which run their course for more than a week and which resemble typhoid fever clinically may be due to salmonella infection. The routine agglutination reaction against the classical TAB may be negative in these cases. If careful blood culture is done, the causative organism may be isolated and the true nature of the fever may then be ascertained. In this way the incidence of such salmonella fevers would certainly be much higher than what is indicated in this paper.

It may be noted that the prognosis of salmonella infection is not always very favourable. Savage (1942) while studying the epidemiological features of 40 British outbreaks due to *B. para B* recorded a case mortality of 1.76 per cent. It has also been stated that the prognosis is worse in war time. Frazer, Glover and Glass (1937) recorded an outbreak of 123 cases of paratyphoid B fever with 11 deaths, i.e. 9 per cent in Liverpool. In our series the case mortality is very high.

the organism has been isolated here more frequently, nevertheless we agree with all the other observers that it is the least common salmonella in India. It has been seen even less frequently than the two new-comers in Calcutta, we mean *B. paratyphosum C* and *B. enteritidis*. About these latter organisms, it may be noted that although none was recorded in Calcutta before 1942 their incidence was found to be fairly steady since 1942 onwards (*vide* table IV). From this table one may also see that *B. paratyphosum C* made its first appearance in 1942, and from the next year its incidence remains at a fairly constant level till July 1946. In 1943, *B. paratyphosum C* was isolated even more frequently than *B. paratyphosum A*. One may remember that this was the time when the Burma evacuees began to pour in. From the next year *B. paratyphosum C* became almost endemic, the infection being maintained steadily probably through new carriers existing amongst these refugees. Hayes and Freeman (1945) also remark 'the movements of civilian population following Japanese invasion of Burma may have played a part in its introduction'. Wasti (1945) on the other hand refers to the detection of many sporadic cases of *B. paratyphosum C* infection among civilian labourers hailing from Bengal, Madras and Nepal, suggesting that these men were exporting the infection. Unfortunately, the times of these isolations are not definitely known. It is more probable that they contracted the infection primarily from the Burma evacuees on the way. Hayes and Freeman (1945) suggest that this infection might have been introduced into India by Chinese personnel.

	<i>B. para A</i>	<i>B. para B</i>	<i>B. para C</i>	<i>B. enteritidis</i>	All salmonellas
Number of cases ..	10	6	15	12	43
Number of deaths ..	2	4	6	6	18
Percentage of case mortality ..	20	66	40	50	42

It is difficult to explain satisfactorily the cause of this unusually high mortality. But the general ill health of the patients in the tropics, their poor resisting power and the delay in their hospitalization may all be contributory factors. Of course the number of cases in this series is very small.

A reference to table III will show the frequency of isolation of the various enteric organisms as recorded by different observers all over India. Lakin (1937) and Manson-Bahr (1945) stated that *B. paratyphosum A* was the commonest cause of enteric fever in India. But all the above figures unanimously repudiate their suggestions about such an incidence. From a further study of the above table, it will be evident that the incidence of *B. paratyphosum A* infection not only varies in different parts of India but also in the same region from year to year. Regarding *B. paratyphosum B*, although

Regarding *B. enteritidis*, a more definite origin may be suggested. The first report of this infection was made by Goyle and Shaikh (1943), the patient being a Burma evacuee. This fact may serve as a proof that *B. enteritidis* infection in Calcutta is a Burma supply, this great city being the chief receiving base for all Burma refugees. Hayes and Freeman (1945) have also received the bulk of their enteritidis strains from Calcutta. In this connection it would be highly illuminating to know the incidence of *B. enteritidis* and *B. para C* infection in Burma. We should not however lose sight of other possibilities. Animal sources might have spread the infection in Calcutta. Ghosal (1941) isolated *B. enteritidis* from 32 rats in Calcutta out of 364 he examined. Meagre hygienic sense among people, closer contact between rats and men, specially due to overcrowding during the Japanese war, with or without a rise in the

infection rate among the rats, might all have played their parts in this connection. *B. paratyphosum C* has, however, refused any animal host so far, being unique in this respect amongst the salmonellas, so that human cases and carriers are the only sources of the infection.

Summary and conclusions

1. Forty-three cases of salmonella fevers have been studied. Except 2 cases, the diagnosis has been established by isolation of the causative organism from the blood.

2. Clinical features including haematological and serological changes have been briefly stated. It has been shown that salmonella fevers are by no means always mild in their course; nor are they attended with a low mortality.

3. The incidence of the various types of salmonella organism in Calcutta as well as in other parts of India has been discussed.

4. The probable causative factors responsible for the heavy incidence of *B. para C* and *B. enteritidis* in recent years have been suggested.

The writers take this opportunity of offering their thanks to the Superintendent, Medical College Hospitals, for his permission to publish the records of the cases.

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A TECHNIQUE FOR THE TREATMENT OF NAGA SORES WITH PENICILLIN

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TROPICAL ulcers, known locally as Naga sores, were carried into the plains of Assam in 1942 by refugees from Burma and by labour forces returning from work on the refugee routes; since then they have become a scourge among both villagers and tea-garden labour forces. All kinds of treatment for septic surfaces have been tried with varying success, but the majority of ulcers are very resistant to treatment, in consequence of which a number of cases used to discharge themselves unhealed as they grew impatient at such slow progress: some cases needed amputation as a life-saving measure.

Penicillin has recently been used as a local application for Naga sores and quickly eradicates the infection; the ulcers usually become painless during the first 24 hours, and a healthy surface on which grafts can be laid is quickly obtained.

The following is a comparison between 35 cases treated with penicillin and 35 cases treated before penicillin came into use:—

	With penicillin	Without penicillin
Average number of days in hospital.	23.1	34.2
Healed or nearly healed on discharge.	33	21
Improved	2	6
Unrelieved .. .. .	..	7
Amputated .. .. .	..	1

Although the average number of days in hospital is still high, this form of treatment constitutes the only real improvement obtained in this hospital since Naga sores were first treated in 1942. The great advantage from the patient's point of view is that the ulcer, which used to remain extremely painful throughout the many days of treatment, is usually made painless within 24 hours. The cost of penicillin is now very much reduced and with careful and economical use the treatment of large numbers of patients can be carried out at very little cost. The technique of dressings described below has been developed with the idea of making the most of each phial of penicillin:—

1. A phial of penicillin is made up with 10 c.c. of water and kept in the refrigerator.
2. Of this, on the first day, a small amount is taken and diluted with water to give 500 units per c.c. (i.e. 1/40 dilution for a phial of 200,000 units).
3. The ulcer is thoroughly cleaned with soft rag or gauze until no more of the slough can be removed: this is important and may require morphia in order to do it thoroughly.

4. Two or three layers of gauze cut to the size of the ulcer are laid on it and soaked with the solution by means of a dropper. If the ulcer is deep or undermined, 2 or 3 drops are put directly onto its surface before applying the gauze.

5. The gauze is covered with rubber tissue, then with more rag or gauze to absorb the pus, and the whole bandaged.

6. All ulcers on the foot or leg are treated strictly in bed.

7. A splint is used for all ulcers on mobile parts such as fingers, dorsum of the foot, ankle region, etc.

8. The dressing is repeated after 24 hours. To allow for deterioration in the penicillin the concentration of the solution used for dressing is doubled on each successive day on which the same phial is used. In view of recent reports on the stability of penicillin it seems that the concentration need not be increased nearly so rapidly and I propose in future not to double the strength of the solution until the fourth day of use.

9. The daily dressing is continued until no slough adheres to the ulcer base when the dressing is removed, leaving healthy granulations. A thin watery pus can safely be ignored.

10. After-treatment consists of grafting any ulcer over about $1\frac{1}{4}$ inches in size. (In the above series of cases all such ulcers were not grafted as permission was not always obtained.) Pinch grafts under local anaesthesia in the ward are suitable for all but the very large ulcers. If grafts are not used any mild antiseptic dressing can be applied until epithelialization is complete.

11. If tendons are involved the infection may be difficult to eradicate owing to the impossibility of bringing the solution into contact with the whole of the infected area: until such tendons slough away there is a focus from which infection may respread if penicillin is abandoned. This may be overcome by:—

(a) Excision of the ulcer—a formidable operation once tendons have been involved.

(b) Parenteral penicillin—an extravagant form of treatment: this was used in two cases of the above series: in one it was used experimentally to compare its effect with that of local application and a soda sulphate solution was used locally; the slough appeared to be no thinner after 24 hours and injections were abandoned in favour of local penicillin which had its usual rapid effect. In the second case injections were used in conjunction with local penicillin on account of the depth and severity of the infection: the result was a dramatic improvement. In my opinion this combined treatment should be reserved for those cases in which the infection is spreading in the deep tissues: this spread is accompanied by marked toxicity and high fever which are rapidly brought under control.

(c) Continuing the penicillin dressing until the whole ulcer is clean—this has the disadvantage

of producing free bleeding from the clean granulations every time the dressing is changed; it is also wasteful.

(d) As soon as the surrounding parts of the ulcer are clean treatment with an antiseptic can be begun, reverting to one or two more penicillin dressings if spread occurs from the sloughing areas. This alternating treatment can be carried on until the whole ulcer is clean during which time epithelialization will have been taking place from the edges.

This technique was used, with aseptic precautions, in the above series of cases. The average number of penicillin dressings used was 5.5.

MEDICAL TREATMENT OF INTESTINAL OBSTRUCTION

By S. M. SADIQ

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THE operative mortality of intestinal obstruction even in expert hands is 40 per cent and may be 80 per cent (British Encyclopædia). If that is the case in the best equipped hospitals under the safest conditions what should be the mortality in the districts which lack x-rays, diathermy, expert anaesthetist and modern instruments, and when the patients come in late at the stage of hiccough and sometimes faecal vomiting.

This is why I took to simple injections of pituitrin, sometimes combined with eserine and atropine for the treatment of obstruction, irrespective of its cause. I must admit that the treatment is definitely blind, but the results so far attained in my opinion justify this treatment. It may be that faecal impaction, tubercular hyperplasia, volvulus and intussusception constitute the commonest causes of intestinal obstruction, as it does not stand to reason that mechanical obstruction due to bands or tumours could be relieved by this treatment. Due to lack of x-rays I have not been able to assign the exact cause in each case nor been able to judge the level of obstruction, that is, whether the small or large intestine is its site, but taking all types of obstruction at ages varying from 14 years upward (I have not as yet tried the treatment on infants and children as none have so far been brought in) the treatment with pituitrin gives a mortality rate of 10 per cent. I have given this treatment to 10 patients by now, out of which one was discharged uncured. This is rather a small number but the disease is not common. The method adopted by me is first to give two consecutive enemata at an interval of one hour and if the result is negative to start injections of pituitrin 1 c.c. subcutaneously till four injections are given. Hot turpentine stupes are given as a routine. Nothing is allowed by mouth. Intravenous glucose and saline are necessary in moribund cases. Early cases come off successfully within three injections, but one may have to continue with courage

for even 48 hours, combining atropine and eserine at occasions as I did in one of my cases.

After the first or the second injection a castor oil enema with 4 ounces of castor oil is given in the knee-elbow position. One sign that I have noted specially is the diminution, however slight, of distension after the first or the second injection and this is a very hopeful sign. If there is no result the enema is repeated after every third or fourth injection till the patient passes a stool. Once there is a good result, castor oil is given by mouth to clear the bowels and no further treatment is required except a very gradual return to normal diet.

man, obstruction for 36 hours. No vomiting, pulse good, cured after three injections.

He came again after one year in exactly similar circumstances and was cured again. He developed diarrhoea two months later. There was a mass in the right iliac fossa obviously looking like a tubercular caecum. He had several times been advised to get himself x-rayed and go in for some surgical treatment but he never agreed to open operation. In this case the cause of obstruction both times had been plastic tuberculosis.

Other cases (all recorded in Panipat Civil Hospital) for sake of brevity are as follows :—

Number	Name	Age	Duration	Admitted	Discharged	Cured/ otherwise
5	Baru	14	3 days	22-11-44	24-11-44	Cured
6	Makhan	60	5 "	9-1-45	11-1-45	Otherwise
7	Mohammad	32	2 "	27-4-45	2-5-45	Cured
8	Rashid	30	14 hours	18-12-45	19-12-45	"
9	Sharifan	30	5 days	21-1-46	31-1-46	"
10	Chorya	30	4 "	21-2-46	26-2-46	"

Case 1.—The first case was a woman, aged 30, pregnant 7½ months, did not agree to operative interference or going to Amritsar or Lahore Hospital. She wanted some sort of medical treatment only. This case is on Hoshiarpur Civil Hospital record between August to November 1937. It was fully explained to her that the injection treatment might cause her the loss of her child, but she agreed. There was no vomiting, abdomen was markedly distended, pulse was good. No visible peristalsis was present. After the usual method of diagnosis, 1 c.c. pituitrin was given subcutaneously and repeated after one hour. She passed a stool after the second injection. Castor oil two ounces was then given by mouth and she passed several motions. Fortunately there was no miscarriage.

Case 2.—Lakhi, aged 38 (record of Sonepat Hospital, 1942), obstruction was of 96 hours' duration, marked facies hypocritica, marked abdominal distension, peristalsis visible at upper part of abdomen. Vomiting had started 24 hours ago, but was only bilious. Pulse was still fair. Two enemata repeated at an interval of one hour produced no result. The injection treatment was started and continued for 24 hours with no relief. Atropine, alone and in combination with pituitrin, was then given every two or three hours for another 24 hours, but without any benefit. The condition of the patient was stationary, he was getting colic every now and then, but passed nothing. After almost 48 hours, with turpentine stupes, flatus tube, repeated enemata and not less than 25 injections, he passed a stool and later on made an uneventful recovery. He is up till now hale and hearty.

Case 3.—Rama, aged 25 (also Sonepat Hospital record, 1942). An emaciated young-

Rectal examination was negative in all cases. Out of 10 cases only one was unsuccessful, giving a mortality of 10 per cent.

Summary

Pituitrin administration is definitely of value in cases of intestinal obstruction. At least this should always be tried before finally deciding on any operative interference.

I am thankful to Captain Mohammad Ajmal Hussain, R.C.M.S., Civil Surgeon, Karnal, for allowing me to publish these cases.

OBSERVATIONS ON AGRANULOCYTOSIS COMPLICATING INDIAN KALA-AZAR

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AGRANULOCYTOSIS occurring in a case of kala-azar is a grave complication. It has been reported to occur in about 7.6 per cent of cases of Chinese kala-azar by Huang (1940). The occurrence of this complication has been regarded as very infrequent in Indian kala-azar (Napier, 1943), the first proved case being reported in 1943 (Das Gupta and Sen Gupta, 1943). During the period of last one year, however, 3 cases of kala-azar admitted under the senior writer were found to develop agranulocytosis. One of these cases has already been reported by us (Sen Gupta and Chakravarty, 1945). In this paper it is proposed to present the notes of all these 3 cases in full detail and discuss the clinical features and the treatment of this serious complication of kala-azar.

Case I.—The patient, an Indian boy, aged 10 years, was admitted on the 28th May, 1945, for irregular fever without chill and rigor for 3 months, emaciation and weakness, and bleeding from the gums for one month. On admission the patient was found to be very weak and anæmic and emaciated. Temperature—102°F., pulse/respiration—138/36. Heart—no abnormality except tachycardia. Lungs—signs of bronchitis. Liver—just palpable. Spleen—enlarged 3½ inches below the 9th rib. *Laboratory investigations:* Urine—no abnormality; stools—hookworm and ascaris ova; blood group B; aldehyde, antimony and complement fixation tests—positive.

Blood counts—

Date	Hb, gm. per cent	RBC in million	MCV	MCH	MCHC	WBC in 1,000	Neutrophil	Lymphocyte	Monocyte	Eosinophil	Plasma cell
20-5	5.91	2.34	91.8	25.2	27.7	1.6	2	59	38	0	1
30-5	..	..	..	..	..	1.1	1	54	44	0	1
1-6	..	..	..	..	..	1.0	0	60	40	0	0
2-6	..	..	..	..	..	1.1	0	58	39	0	3

Agranulocytosis was thus seen before any treatment was given.

On 29th May, 1945, it was found that the patient had high fever of 104°F., and was looking very ill. Some purulent blisters surrounded by a zone of erythema had developed over the chin and over the abdomen. The tongue was not sore and the patient had no difficulty in swallowing. Pulse/respiration—144/40 per minute. Blood count showed agranulocytosis. The patient was put on penicillin 20,000 units intramuscularly every 3 hours, sodium antimony gluconate intramuscularly and liver extract parenterally, besides various supportive treatments. Pentnucleotide was not available. During the next 2 days the purulent blisters, which had yielded pure growth of *Staphylococcus aureus*, subsided but the general condition did not show any improvement. Signs of peripheral circulatory failure developed on the 31st May, and the condition did not respond to serum transfusion, suprarenal cortical extract, and various other therapeutic measures. The patient died on the 4th June, 1945.

Case II.—The patient, an Indian male, aged 30 years, was admitted on the 21st February, 1946, for: (1) *Irregular attacks of fever resembling malaria for 3 years.* The fever used to respond to quinine in the beginning but relapses occurred. About 5 months back following an attack of high fever, the patient developed a foul-smelling sore (canerum oris) over his palate. He was treated for this condition by the local doctor and the ulceration healed slowly after one tooth with a bit of bone had separated out. But the fever along with progressive weakness persisted. (2) *Cough with expectoration.* This

commenced with the ulceration in the mouth and gradually became worse, and 2 months back, he noticed a swelling over the precordial area. This swelling subsided to a great extent more or less spontaneously but a few days preceding his admission into the hospital the swelling reappeared. (3) *A scaly eruption all over the body.* This usually came on every winter and disappeared in spring or summer. The present attack was said to be more extensive.

On admission, the patient was found to be very weak, emaciated and anæmic. There was a generalized dermatitis somewhat resembling pellagrous dermatitis all over the body. One upper premolar tooth of the left side was missing. The liver was enlarged as also the spleen which

was enlarged up to 4 inches. *Heart:* apex beat could not be located with certainty, the sounds were normal. *Lungs:* showed signs suggestive of fluid in the left pleural cavity. There was a swelling over the precordial region in the lower and outer part, the swelling was diffuse and tender over the ribs.

Laboratory investigations showed positive indications of kala-azar along with marked anaemia.

Other findings

STERNAL PUNCTURE REPORT

Red cell series	..	84.0		
Normoblast	{ A ..	..	..	2.5
	{ B ..	..	..	4.75
	{ C ..	..	..	76.75
Granular series	..	6.25		
Neutro myelo	{ A ..	..	..	..
	{ B ..	..	..	1.5
Eosino myelo	..	..	..	1.75
Eosino meta myelo	..	..	..	0.25
Eosino band	..	..	..	1.0
Eosino segmented	..	..	..	1.75
Non-granular series	..	9.75		
Lymphocyte	{ A ..	..	..	5.75
	{ B ..	..	..	3.25
Plasma cell	..	..	..	0.75
Pre-monocyte	..	..	..	..
Parasites	..	..	..	L.D. +

Dated 13th March, 1946.

Complement fixation test for kala-azar—strongly positive.

Aldehyde test.—+++.

On screening under x-rays, it was found that the patient had fluid and gas in the left pleural cavity.

Blood counts—

Date	Hb., gm. per cent	RBC in million	MCV	MCH	MCHC	WBC in 1,000	Neutrophil	Lymphocyte	Monocyte	Eosinophil	Plasma cell
1-3-46	5.5	2.57	83.6	21.4	25.5	1,650	..	16	..	..	..
13-3-46	..	..	..	..	..	800	2	90	8	0	6
14-3-46	..	..	..	..	..	..	0	86	8	0	6
15-3-46	..	..	..	..	..	800	2	86	6	0	6
18-3-46	..	..	..	..	..	1,700	54	35	1	3	0
3-4-46	7.8	3.32	90.36	23.6	26.12	5,300	58	41	1	0	1

Skiagram (23rd February, 1946).—Fluid with a horizontal level on the left side—very little cardiac displacement.

Course and treatment.—As the patient was apparently suffering from pyopneumothorax he was put on a course of sulphonamides for a week. The fever subsided and the swelling also became distinctly less. Soon after this course of sulphonamides on 6th March, 1946, the patient was put on a course of pentamidine as specific treatment for kala-azar. On the 10th March, it was found that the precordial swelling was more prominent, and the patient was having high temperature, he was put on a course of sulphadiazine on the suspicion of a renewed activity of the intrapleural condition. On the 13th March, the patient complained of soreness of the tongue and slight difficulty in taking his meals. The tongue was found to be superficially ulcerated and denuded of epithelium and bleeding in places. Also there were some whitish patches over the tongue. A blood count was immediately done and it was found that the patient had developed agranulocytosis; the leucocyte count was 800 per c.mm. and there were only 2 per cent neutrophil polymorphonuclears. Sternal puncture was also done (*see table*). Sulphadiazine was immediately stopped, and in order to bring the leishmanial infection rapidly under control, sodium antimony gluconate was substituted for pentamidine. To combat agranulocytosis, pentnucleotide 10 c.c. was given intramuscularly twice a day, and whole liver extract 4 c.c. intramuscularly daily, and to combat the infections in the mouth and elsewhere, penicillin was administered intramuscularly for the next 5 days. Blood counts were made on consecutive days. On the 18th it was found that the patient was looking much brighter and afebrile. The blood count on this day showed that he had got over agranulocytosis, WBC being 1,700 per c.mm. with 54 per cent neutrophils. After this date the progress of the patient was satisfactory. The sores on the tongue gradually healed up and the size of the spleen commenced diminishing. The dermatitis was still present and had responded but slightly to niacin and liver extract injections. The

patient was discharged as clinically cured of kala-azar on 23rd April, 1946.

Case III.—An Indian female, aged 18 years, attended the kala-azar outpatients' department on the 12th April, 1946, for fever, at first intermittent, later remittent in type, of duration of about 2 years, and progressive weakness and emaciation and enlargement of the spleen. On examination the patient was found to be thin and anæmic, with accentuation of pigmentation over the forehead and face. The spleen was enormously enlarged measuring 9 inches below the costal margin and the liver was enlarged up to 2 inches below the costal margin. The heart and lungs did not show any abnormality. The aldehyde, antimony and the complement fixation tests for kala-azar were all positive and the patient was diagnosed as a case of kala-azar and she was put on aminostiburea. (The patient said that before coming to the outpatients' department she had four injections of urea stibamine.)

At the time of commencement of the injections of aminostiburea the patient was having high fever, the temperature rising up to 104°F. After she had received about 4 to 5 injections the fever subsided considerably, temperature rising up to 99°F. After she had received the 8th injection the patient started high fever and was then taken into the hospital on the 21st May, 1946.

On admission into the hospital the patient was found to be very ill and the temperature was rising up to 104°F. The injections of aminostiburea were continued for 2 consecutive days but without any effect on the fever. There were no signs of any systemic complication to explain the persistence of the high fever and the general deterioration of the patient. It was then suspected that probably the patient had developed agranulocytosis, the reason for this being the similar apparently unexplained pyrexia seen in the previous cases, the presence of a very thin whitish filmy patch over the left tonsil and the swelling of the submaxillary lymph glands of the left side. (On culture *St. viridans* and *Staphylo aureus hæmolyticus* were isolated from left tonsil.) There was however no soreness of the tongue or any difficulty in

swallowing. A blood count was done and it was found that there were no granulocytes. The total WBC count was only 1,500 per c.mm.

The patient was immediately put on pentnucleotide 10 c.c. intramuscularly twice daily, liver extract (crude) 4 c.c. intramuscularly daily, penicillin 20,000 units intramuscularly every 3 hours besides other symptomatic treatment.

In addition she was given injections of percorten and coramine by mouth from the 4th day of commencement of treatment for agranulocytosis on account of the very low blood pressure (85/35) and gallop rhythm of heart sounds and asthenia. The specific treatment for kala-azar was withheld for the first 2 days on the suspicion that the antimonial might be responsible for producing agranulocytosis. But as it was found that there was no improvement during these days of treatment, the specific treatment was re-started, the drug used being sodium antimony^v gluconate. On the next day the temperature started coming down and reached normal. During these days, though the swelling of the lymph glands and the patch over the tonsil had disappeared within 2 days of commencement of treatment, the fever and the general condition had remained unaffected and patient had remained desperately ill; the temperature had remained near about 104°F., and energetic hydrotherapy had to be adopted. The blood count on the 5th day showed that the neutrophils were 19 per cent of 1,550 leucocytes (i.e. 294.5 neutrophils per c.mm.). Except for an attack of diarrhoea the subsequent progress of the patient was uneventful. She required a full course of specific treatment for kala-azar with sodium antimony^v gluconate for clinical recovery from kala-azar. Blood counts are seen in the table.

Penicillin was continued for 5 days, liver extract and pentnucleotide for a week.

Fever.—There was a high fever, the temperature ranging between 102° and 105° in all the cases concurrently with the development of agranulocytosis and this persisted till this complication was relieved. The patient who developed agranulocytosis about the middle of a course of injections of a pentavalent antimonial was almost afebrile for days preceding the onset of this complication, which was accompanied by high rise of temperature. This was also noted in case II. The other patient, an untreated case of kala-azar, was admitted with agranulocytosis and he had high fever.

The fever was found to persist at a high level as long as the condition of agranulocytosis persisted, even when there was no apparent infection anywhere, and all the infections present had been relieved by the administration of penicillin. Only when the total neutrophil count in the peripheral blood rose to above 250 or so per c.mm. did the temperature come down (see temperature charts).

Other general symptoms.—Deterioration of the general condition and prostration were noted in all cases. This was a striking feature because in the uncomplicated cases of kala-azar the patients do not feel the fever to any great extent, prostration is exceedingly uncommon and they can usually go about with a temperature of 103°F. or so.

It appears that there is some danger of circulatory failure in agranulocytosis complicating kala-azar. One patient (case I) developed peripheral circulatory failure and another (case III) showed very marked lowering of blood pressure along with gallop rhythm of the heart sounds.

Soreness of the mouth and anginal symptoms.—Affection of the mucous membrane of the mouth and pharynx was found to be entirely absent in case I, and in the other 2 cases, there was

Date	Hb., gm. per cent	RBC	MCV	MCH	MCHC	WBC	Neutrophil	Lymphocyte	Monocyte	Eosinophil	Basophil	Plasma and Turk cell
23-5-46	5.5	2.70	81.4	20.3	25.0	1,500	0	83	17	0	0	..
24-5-46	..	..	..	..	..	1,750	1	64	31	0	0.5	3.5
25-5-46	..	..	..	..	..	2,000	2	85	9	0	0	4
27-5-46	..	..	..	..	..	3,800	6	73	17	0	0	4
28-5-46	..	..	..	..	..	1,550	19	72	4	1	1	3
30-5-46	..	..	..	..	..	2,300	50	38	12	0	0	0
5-6-46	6.325	2.60	94.2	24.3	25.8	3,000	41	52	7	0	0	0

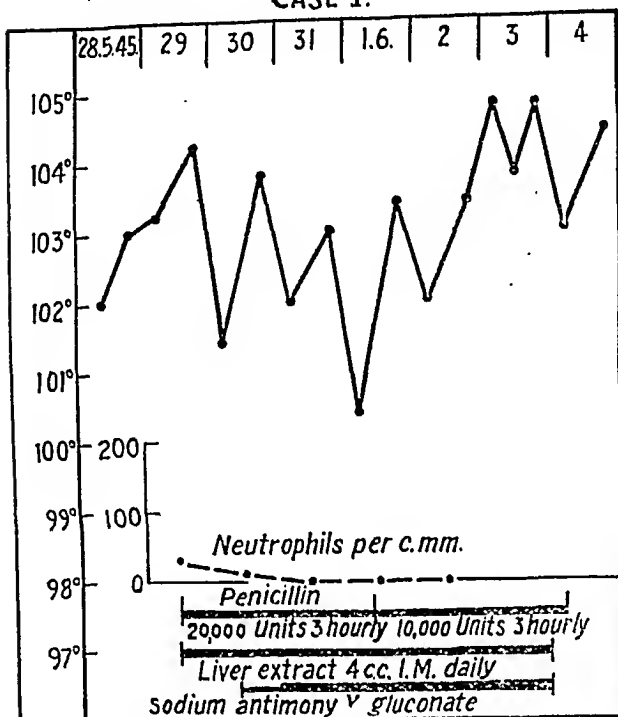
Discussion

Clinical features.—The principal symptoms present in the cases reported here are considered under the following headings: fever, soreness of the mouth and anginal symptoms, secondary infections, other general symptoms, and the hæmatological changes.

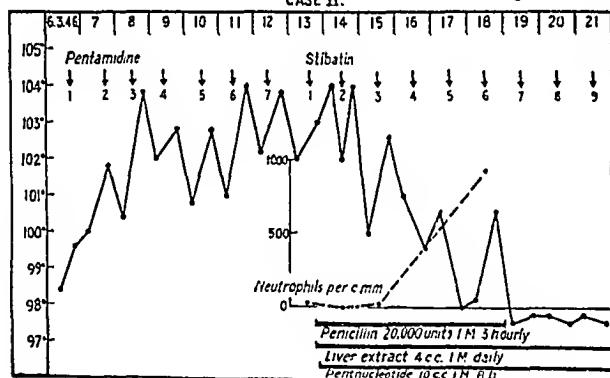
only a slight degree of inflammation with the formation of very inconspicuous membrane over the tonsil along with a swelling of the submaxillary lymph glands. There was no dysphagia in any case. This latter symptom was well marked in the first case reported in 1943 (Das Gupta and Sen Gupta, *loc. cit.*)..

Other secondary infections.—It is said that secondary infections are responsible for the fatal termination in agranulocytosis. In case I that

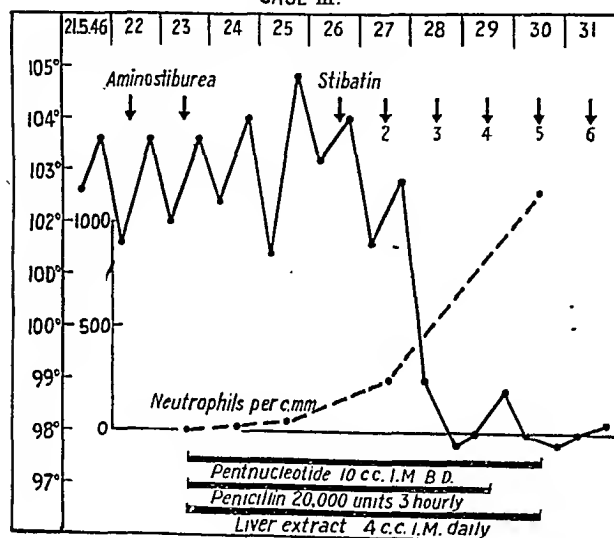
CASE I.



CASE II.



CASE III.



went to a fatal termination there were seen several purulent blisters over the face and the trunk but these subsided entirely within 2 days of penicillin therapy.

No other secondary infection was seen in this case yet the patient died. The other 2 cases did not show any secondary infections. Blood culture done in one case did not yield any growth of bacteria.

Haematological changes.—In these 3 cases the leucocyte count at the onset of agranulocytosis varied from 800 to 1,600 per c.mm. with the neutrophils varying from 0 to 2 per cent, the absolute number of the neutrophils varying between nil to 32 per c.mm. Sternal puncture done in one case showed definite paucity of the cells of the granulocyte series.

It was found that the number of granulocytes rose to the level of 250 or so after about 4 to 5 days' treatment for agranulocytosis.

Treatment

In a recent review of the treatment of agranulocytosis (Annotations, *Lancet*, 1946), it was pointed out that though Dameshek was of the opinion that the death in agranulocytosis was not due to this condition as such but to bacteraemia and septicaemia which invariably ensued, the evidence of such sepsis was not very clear. Also the use of penicillin has been regarded as very valuable for no convincing reason, because the patients who were treated with penicillin had other therapy in addition, viz. pentose nucleotide, liver extract, blood transfusion, etc. The view expressed by the writer about penicillin is that it is only useful as an antibacterial drug without any depressant action on the granulocytes.

The treatment adopted in the above 3 cases consisted of (a) penicillin to combat or prevent sepsis, (b) leucopoietic drugs, pentose nucleotide and whole liver extract (pentnucleotide was not available for case I), (c) specific treatment for kala-azar, (d) general supportive measures, including intake of adequate nourishment, vitamins and glucose, and (e) symptomatic treatment for high fever, circulatory failure, etc.

Penicillin was found to control and eradicate the infections in the mouth in these cases within 2 or 3 days and no serious secondary infection developed during the course of its administration. But it had apparently no effect on the fever in any case.

The *leucopoietic* drugs, pentnucleotide and liver extract are well recognized for their value in agranulocytosis. Pentnucleotide was given in 10 c.mm. doses at least twice daily by intramuscular injections and whole liver extract was given in 4 c.cm. doses intramuscularly daily.

Specific treatment of kala-azar with pentavalent antimonials.—It is well recognized that agranulocytosis may occur in untreated kala-azar as well during treatment. The marked granulopenia and anaemia in kala-azar are regarded as caused by the replacement of the

hæmo- and leucopoietic cells in the marrow by the marked proliferation of the macrophage cells, a high proportion of which are parasitized. It is possible that in some cases of kala-azar agranulocytosis is due to severity of infection, the excessive proliferation of the macrophages almost entirely replacing the formative elements in the marrow. Sternal puncture smears of 2 cases (case II and the case reported in 1943) showed a very marked aplasia of the cells of the granulocytic series. Also in both these cases unusually large numbers of parasitized and non-parasitized macrophages were seen. Zia and Forkner (1934) also published photomicrographs of sections of bone marrow showing large number of parasitized macrophages and extreme paucity of the myelocytes and more mature granulocytes.

In the cases where agranulocytosis developed during the course of treatment with pentavalent antimonials the workers in China were of the opinion that antimonials played some part in precipitating an attack of agranulocytosis. This is no doubt possible, though repeated injections of antimony compounds have never been found to possess any significant action on the blood picture of experimental animals by Forkner. The other possibility in such cases is that treatment may either be inadequate in controlling a severe infection or cause a further stimulation and proliferation of the macrophage cells thus leading to a further depression of granulopoiesis. It is not possible just at present to decide either way. But it may be mentioned that the patient, who developed agranulocytosis after receiving about a dozen injections of antimonials, required a second full course of injections of a different antimonial for her clinical cure of kala-azar.

The question whether the pentavalent antimonials should be used or not during agranulocytosis is however not difficult to decide. In untreated cases of kala-azar it is justifiable to administer antimonials, and in the cases where the condition develops during the course of treatment with an antimonial, it is more reasonable to withhold antimonials till the condition subsides, and then start treatment of kala-azar with a different antimony compound.

There is little to discuss about the general supportive measures and symptomatic treatment. Blood transfusion is regarded by some workers as valuable; but unless the patient is severely anæmic, there does not seem to be any indication for this procedure which may prove risky in patients with high temperature of 103° or higher. Chances of hyperpyrexial reactions are not inconsiderable even with blood samples from well-regulated blood banks and when the technique of transfusion is beyond reproach.

Summary and conclusions

Three cases of agranulocytosis complicating kala-azar are reported and the clinical features discussed. It has been found that the usual

lesions affecting the mucous membrane of the mouth and the pharynx may be very inconspicuous or even absent in some cases. The high fever that is associated with agranulocytosis persists even when there is no apparent infection anywhere and the slight infections present entirely relieved by penicillin, till about 250 or more neutrophil cells appear in the peripheral blood.

The treatment of this condition is discussed. Penicillin relieves the oral lesions if present and it can prevent secondary infection with a large group of organisms. The well-known leucopoietic agents, pentnucleotide and whole liver extract should be administered in full doses. The specific treatment for kala-azar with pentavalent antimonials should be given in previously untreated cases. But in the cases where agranulocytosis develops during antimony treatment it is preferable to withhold the specific treatment of kala-azar till this complication has been relieved. The treatment should include general supportive measures, viz, adequate nourishment and fluid intake, and symptomatic treatment for toxæmia, circulatory failure, etc.

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[P.S.—After this paper had been sent for publication one more case of previously untreated kala-azar complicated by agranulocytosis was admitted under my care. The diagnosis was made on clinical grounds and confirmed hæmatologically and by finding leishmania on sternal puncture. The treatment was by a pentavalent antimonial-penicillin-pentnucleotide liver extract—therapy along with general supportive measures. The patient made an uneventful recovery, the high fever persisting till the subsidence of agranulocytosis.—P. C. S. G.]

THE ÆTIOLOGY OF 'PHRYNODERMA'

By C. GOPALAN, M.D.

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A LARGE number of cases of phrynoderma was observed among the patients that attended the Nutrition Clinic. In the present investigation, the following observations were made regarding (a) the incidence of phrynoderma and (b) the response of the disease to certain lines of treatment.

Incidence

Age and sex.—In the course of the investigation, 116 cases of phrynoderma were observed. Most of these cases belonged to the poor class and a few to the so-called 'lower middle' class.

The distribution of the cases according to sex and age groups is given below :—

	Below 5	5 to 10	10 to 15	15 to 20	Above 20
Males ..	1	12	20	11	7
Females	2	18	28	13	4

It is noteworthy that nearly 70 per cent of the cases were between 5 and 15 years. The incidence in adults was relatively low. A significant feature was the strikingly low incidence, less than 3 per cent, in children below 5 years.

The age and sex incidence of a group of 134 cases of xerophthalmia observed in the course of the investigation was as follows :—

	Below 5	5 to 10	10 to 15	15 to 20	Above 20
Males ..	36	21	9	5	2
Females	28	18	7	5	3

Nearly 50 per cent of cases of xerophthalmia were children below 5 years. Thus, accepted manifestations of vitamin A deficiency were predominantly present in children below 5

of nutritional deficiency. The others presented obvious signs of malnutrition as shown below :—

	B ₂ complex deficiency signs	(1) + xerophthalmia	Xerophthalmia alone
Number of cases of phrynoderma.	91	14	4

Thus in nearly 92 per cent of cases of phrynoderma, clinical evidences of B₂ complex deficiency were present. On the other hand accepted clinical evidence of vitamin A deficiency was present in about 15 per cent of cases of phrynoderma.

The incidence of phrynoderma in a group of 134 cases of xerophthalmia drawn from the Ophthalmic and Nutrition departments was also investigated and is represented below :—

	With phrynoderma unassociated with B ₂ complex signs	With phrynoderma associated with B ₂ complex signs	Without phrynoderma
Number of cases of xerophthalmia.	4	14	116

Seasonal incidence.—The incidence was high in the colder months of the year. With the coming in of the hot season, there was a distinct decline in the number of cases observed. It may be pointed out that the average attendance at the Nutrition Clinic was nearly the same throughout the period of the investigation.

	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April	May	June	July
Number of cases	6	11	19	22	21	16	8	3	2	3	2

years; and it was in this very age group that phrynoderma was particularly rare.

Associated deficiency signs.—Of the 116 cases observed, 4 cases did not show any clinical sign

Treatment

Therapeutic trials were carried out on 37 cases of phrynoderma with six kinds of treatment as indicated in table I.

TABLE I

NUMBER OF CASES OF PHRYNODERMA

Treatment	Total	Associated with B complex signs alone	Associated with B complex signs and xerophthalmia	Associated with xerophthalmia alone
1. Vitamin A concentrate ..	5	1	3	1
2. Nicacinamide ..	4	3	1	..
3. Riboflavin ..	5	3	2	..
4. Yeast extract ..	9	6	2	1
5. Linseed oil ..	6	5	1	..
6. Yeast extract + linseed oil ..	8	6	2	..

These cases were treated as out-patients so that the hospital diet may not vitiate the results. The patients continued to subsist on their usual diets during the period of treatment and did not get any drug other than that used in the investigation. Treatment on the different lines was carried out for periods ranging from 5 to 6 weeks. To assess the result of the treatment, it was found convenient to 'grade' the cases after treatment as follows (see figures, plates I and II).

Grade I—Cases in which there was definitely no improvement.

Grade II—Cases in which the improvement was 'not definite' or 'doubtful'—inconclusive. In this grade are included cases in which the 'eruptions' appeared to have become relatively sparse in places but had not disappeared partly or entirely from any area.

Grade III—Cases in which improvement was definite but not complete. In this grade are included cases in which at the end of treatment the 'eruptions' had disappeared partly or entirely from certain areas and over other areas they had become sparse.

Grade IV—Cases in which improvement was 'complete'. The 'eruptions' had disappeared almost completely leaving behind small circumscribed areas of pigmentation.

The treatment adopted and the response thereto are indicated in table II.

these therapeutic tests, are all fair sources of fatty acids.

Another point that has to be considered in a number of these therapeutic tests is with regard to their prolonged duration. It has been shown that the incidence of the disease is definitely influenced by seasonal factors and the same observation has been made by several workers. It is a question, however, whether seasonal variation can influence the course of an established case; but the possibility may not be denied. The possible contribution of the seasonal variation to the result of treatment has to be remembered in assessing the value of therapeutic tests spread out over several months.

Several workers including Frazier and Hu (1936), and Frazier, Hu and Chu (1943) have remarked on the lack of correlation between the incidence of phrynoderma and accepted signs of vitamin A deficiency. Frazier and Hu (1931) suggest that the preponderant incidence of phrynoderma in the second decade is related to the development of the pilosebaceous glands occurring round about the pubescent period. If this were so, it would explain the absence of phrynoderma in cases of keratomalacia occurring in infancy and early childhood, but cannot explain either the frequent absence of phrynoderma in older cases of keratomalacia or the frequent absence of keratomalacia in cases of phrynoderma. Hawes (1945) on the other hand

TABLE II

Treatment	Daily dosage	Number of cases	RESPONSE			
			Grade I	Grade II	Grade III	Grade IV
Vitamin A concentrate ..	10,000 I.U.*	5	4	1	..	..
Niacinamide ..	200 mg.	4	4	..	..	..
Riboflavin ..	10 mg.	5	3	2	..	..
Yeast extract ..	4 to 6 drachms	9	..	1	3	5
Linseed oil ..	1 to 2 ounces	6	..	2	2	2
Yeast extract + linseed oil ..	4 to 6 drachms + 1 ounce of oil.	8	..	..	1	7

* Parenterally in 3 cases and as capsules orally in 2 cases.

Discussion

The vitamin A deficiency hypothesis.—Much of the support for the vitamin A deficiency hypothesis has been derived from the observation of several workers that administration of substances rich in vitamin A—fish liver oils—over prolonged periods has cured the skin disorder. Stannus (1945) has pointed out that the tests employed have generally been not exclusive and control observations have been wanting. 'For many cod liver oil has been synonymous with vitamin A and supplements to the diet have often been made at the same time'. It must be remembered that the fish liver oils used by some workers, and cotton seed oil, groundnut oil, etc., employed by some others as vehicles for the vitamin A concentrate in

suggests that the predominant incidence of phrynoderma in this period may be due to a marked disparity between the carbohydrate intake and fat intake in the diet of the poor in this period which may accentuate a relative deficiency of some fatty acid.

Frazier and Hu (1936), and Lehman and Rapaport (1940), remarking on the absence of xerophthalmia in several cases of phrynoderma, suggest that in the evolution of the clinical signs of vitamin A deficiency, the skin manifestations may precede the ocular signs. Even if this were true, it would not explain the frequent absence of phrynoderma in advanced cases of xerophthalmia. Moreover, Jeghers (1937) and Getz (1944), who attempted to induce vitamin A deficiency in man, found that the very first

manifestations were always ocular. Bloch (1917) and Pillat (1929) who studied the condition of the skin in cases of keratomalacia did not find follicular lesions. Bloch (1917) reported on the other hand 'a dry shrivelled and scaly condition of the skin' and Pillat (1929) described the skin in keratomalacia as 'slaty-grey, wrinkled, dry and scurfy'.

Lehman and Rapaport (1940) point out, in support of the vitamin A deficiency theory, that in 9 cases of phrynoderma in which there was no evidence of xerophthalmia, dark adaptation tests revealed impairment of adaptation. Sub-clinical defects cannot have the same significance as manifest clinical signs with regard to the ætiology of an associated disorder. Moreover, recent work (Kimble and Gordon, 1939; Morton, 1944; Pollak, 1945) seems to suggest that deficiency of some members of the B complex may also have some relation to the impairment of dark adaptation in some cases.

Rao (1937) concluded from a histopathological study of his cases that in the development of the disorder vitamin A deficiency may probably be an important factor. But Wolbach and Bessey (1942), reviewing the tissue changes, suggest that the disorder 'might be related to riboflavin deficiency rather than A deficiency, as previously concluded from rather inadequate evidence'. Moulton (1943) observed lesions closely resembling those of phrynoderma in rats fed on diets deficient in vitamin A. Stannus reveals that the vitamin, in this experiment, was administered in the form of a fish liver oil concentrate of high potency diluted with edible groundnut oil. The introduction of groundnut oil in the experiment would seem to vitiate its value.

The results obtained here do not support the vitamin A deficiency hypothesis. While the dosage of vitamin A used here was larger than that employed by other workers, the duration of treatment was less. However, cases of phrynoderma of comparable severity treated for the same duration on other lines improved definitely. Stannus (1945) and Hawes (1945) also failed to obtain improvement in their cases with vitamin A. Hawes employed vitamin A by injection in large doses 'without observing the slightest effect on the skin' on his cases in the East.

Yeast extract.—The observation that there is correlation between the incidence of phrynoderma and signs of B₂ complex deficiency has also been made by other workers (Platt and Gin, 1935). Nicholls (1933, 1934) reported the presence of neuritis, angular stomatitis and glossitis in several of his cases of phrynoderma.

The frequent presence of signs of B₂ complex deficiency in several cases of phrynoderma and the response of the disease to intensive treatment with yeast extract would suggest that the condition is related to deficiency of some factor in the B₂ complex. This factor is evidently something other than (or more than) nicotinic acid or

riboflavin since neither of these by itself yielded the results obtained with yeast extract.

Linseed oil.—The satisfactory result obtained in some cases of phrynoderma with raw linseed oil probably supplies the explanation for some puzzling features regarding phrynoderma. Raw linseed oil is a rich source of unsaturated fatty acids including linoleic and linolenic acids but does not contain appreciable amount of vitamin A. The failure of vitamin A concentrate to appreciably influence the skin condition in cases of phrynoderma and the success obtained, in some cases with raw linseed oil would suggest that the curative effect claimed for the fish liver oils is probably due to the fatty acids contained therein.

Yeast extract and linseed oil.—The combined use of yeast extract and linseed oil was more effective than either of these employed separately. It has been demonstrated by several workers (Burr and Burr, 1929; Hogan and Richardson, 1935; Birch, 1938) that there is a definite relationship between the metabolism of certain members of the B₂ complex and that of some unsaturated fatty acids in experimental animals. Birch and György conclude that 'in the absence of a decent supply of certain vitamins of the B₂ group, the animal is unable to make proper use of the fatty acids, or alternatively, in the absence of adequate amounts of unsaturated fatty acids, the animal is unable to utilize these vitamins'.

The lesions reported in these experimental animals, however, do not strictly parallel the lesions in phrynoderma. But it is perhaps possible in the human subjects also, that in the absence of adequate amounts of certain members of the B₂ complex from the diet, there is an imperfect utilization of fatty acids or *vice versa*; that a vicious circle is thus set up, which ultimately leads to the development of the characteristic skin lesions of phrynoderma. If this were so, one may expect to correct the disorder by supplying either the fatty acids or the members of the B₂ complex, but the results are likely to be better if both these substances are used in combination. The observations made in this investigation seem to bear out this expectation.

Summary and conclusions

1. One hundred and sixteen cases of phrynoderma were studied and the response of 37 cases to six different lines of treatment was investigated.
2. The results of the investigations have been discussed and the vitamin A deficiency hypothesis has been examined.
3. The suggestion has been advanced that phrynoderma may be due to related deficiencies of certain members of the B₂ complex and fatty acids.

I am grateful to the Superintendent and staff of Stanley Hospital, Madras, for the facilities extended to me for the conduct of this investigation.

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EXPLANATION OF ILLUSTRATIONS

- 1-a and b .. A case of phrynoderma before treatment.
 2-a and b .. The same case after 6 weeks of treatment with pure raw linseed oil. The 'eruptions' have mostly disappeared but small circumscribed areas of pigmentation marking their sites still remain.
 3, 4 and 5 .. Deficiency signs associated with phrynoderma.
 3-a .. Angular stomatitis in a case of phrynoderma. The conjunctivæ appear bright and clear.
 3-b .. Skin condition of the case shown in 3-a.
 4-a .. Shows angular stomatitis with acne-form comedones on the face. Conjunctivæ appear bright and clear.
 4-b .. Skin condition of the case shown in 4-a.
 5-a .. Angular stomatitis and glossitis in a case of phrynoderma. The picture shows the patient much darker than she actually was, the conjunctiva therefore appears brownish but actually there was no evidence of xerophthalmia.
 5-b and c .. Skin condition of 5-a above.

ANEURYSM OF THE PULMONARY ARTERY WITH PATENT DUCTUS ARTERIOSUS

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ANEURYSM of the pulmonary artery is a rare condition. In the Indian literature, the case reported by Rogers (1908) of a dilatation of the artery with atheroma seems to be the only case. Scott (1934) was able to collect 89 cases from literature between the periods of 1836 and 1934. Wahl and Gard (1931) reported a case of aneurysm of the pulmonary artery in a girl aged 19. In this case symptoms dated from birth. Pre-operative diagnosis was mitral stenosis and mediastinal tumour, no pulsation on screen. Hæmoptysis was present, blood Wassermann was negative. E.C.G. showed right side preponderance. X-ray therapy had no effect on tumour masses. The case was observed for 27 months. Definite signs of heart failure at rest developed with clubbing of the fingers. Bulging of the manubrial area increased and the patient complained of a dull pain in the same area and hæmoptysis with constant cough. The case was operated upon, and the tumour exposed and incised. Blood gushed out and the patient died. Autopsy showed wide open patent foramen ovale. Pulmonary artery and the two branches up to the point of entry into the lung were greatly dilated. Wilkinson (1940) reported a case of aneurysmal dilatation in a girl of 10, with rupture of the pulmonary aneurysm into the pericardium. Holmes (1944) has reported a case of patent ductus arteriosus associated with pulmonary aneurysms and infective endocarditis.

Ætiology.—While, undoubtedly, the commonest cause of aortic aneurysm is syphilis, it is not so in the case of pulmonary artery aneurysm. Diseases of the pulmonary artery and its branches are of manifold ætiology and the different age groups are affected almost equally.

1. Aneurysm of the pulmonary artery seems to be most often congenital in origin. Congenital dilatation of the pulmonary artery is associated with other congenital defects, as patent ductus arteriosus, and patent inter-arterial (the commonest) or inter-ventricular septum. The pulmonary valves are in most cases bicuspid. Trauma, as by a bullet wound of the chest, has caused aneurysm. Rupture of the dilated aneurysm has been observed in a few cases. It is noteworthy that in nearly all cases of patent ductus arteriosus, the pulmonary artery is dilated to some extent. Aneurysm of the patent ductus arteriosus has also been recorded.

2. Less often it is associated with syphilis. Warthin has demonstrated the spirochæte in the aneurysmal wall in one case.

The other conditions in which the pulmonary artery is dilated are :—

3. Rupture of an aortic aneurysm into the pulmonary artery.

4. Fistula formation between the aorta and the pulmonary artery due to ulceration (syphilitic often, atheromatous rarely), mechanically same as patent ductus arteriosus.

5. Mitral stenosis.

6. Congestive heart failure cases, irrespective of the primary cause of the heart failure.

7. In pulmonary tuberculosis, the branches of the pulmonary artery stretching across a tuberculous cavity may undergo aneurysmal dilatation.

Clinical features.—These cases are very difficult to recognize clinically. They may simulate either an aortic aneurysm or a mediastinal tumour. Ante-mortem diagnosis has been made in a few cases. The aneurysm of the pulmonary artery occurs at a younger age than the aortic aneurysm. Cyanosis and dyspnoea occur. Pulsation is present in the left side of the chest, close to the sternum, particularly in the second and third interspaces. Persistent and troublesome cough may occur. These patients die of rupture of the dilated artery, or of septic endocarditis, and rarely of congestive heart failure or of inter-current infection. Radiologically, these aneurysms may or may not show pulsation. In a number of cases, including the one reported here, absence of pulsation has been noted. Henschen believes that the diagnosis of pulmonary artery aneurysm can be made by the following features :—

1. Prominence of the 2nd and 3rd costal cartilages with well-defined dullness and an x-ray shadow in this area.

2. Intense cyanosis and other signs of congestion, hæmoptysis and substernal pain.

3. Pulsation and well-defined thrill and murmur in the second and third left interspaces.

4. Loud superficial rasping systolic murmur.

5. Right side cardiac hypertrophy.

6. Absence of usual signs of aortic aneurysm, i.e. dullness to right, difference in pulse and recurrent laryngeal paralysis.

7. Absence of dilatation or hypertrophy of the left heart, i.e. apex dullness within the mid-clavicular line.

Case report

A Hindu male, age 25, came to me nearly three years ago and was kept under observation for a month and was discharged as a case of mediastinal tumour. He complained of swelling and pain over the pericardium and pain in the joints of two years' duration. He noticed gradually increasing bulge over the pericardium, dyspnoea on exertion and pain in the precordial area. Sometimes the patient had blood-stained sputum.

General condition.—A fairly nourished person. Precordial bulge on the left side close to the

body of the sternum. No cyanosis or clubbing of the finger nails.

Cardiovascular system.—Heart boundaries on the left side $2\frac{1}{2}$ inches outside left mid-clavicular line. Upper border 3rd rib on the right side lateral sternal line. The entire pericardium and the area about 3 inches from the lateral border of the sternum over the 2nd and 3rd left interspaces were dull on percussion. Pulsation was also present over those areas. Reduplicated first sound in all areas. Diastolic murmur heard between the mitral and pulmonary areas, particularly close to the sternum.

Respiratory system.—Left inter-scapular region dull and breath sounds feeble in the same area, otherwise nil abnormal.

Alimentary system.—Nil abnormal.

Laboratory findings.—Urine normal. Blood : total R.B.C. 4 to 3.7 million per c.mm. W.B.C. 7,000 per c.mm. Haemoglobin 85 per cent. Blood Wassermann negative, blood pressure arm : 120 to 75, legs 140 to 95. X-ray of the chest showed a shadow of the size of a tennis ball seen in continuation with the heart shadow to the left (figures 1, 2 and 3, plate III). Lateral view of chest showed no erosion of ribs. Screening with barium meal showed no deviation of the œsophagus. Very little pulsation in the shadow compared to the dynamic pulsation of the heart (? transmitted pulsation from the heart). E.C.G. left ventricular preponderance. Artificial pneumothorax was done and there was a broad band of lungs adhering to the chest wall with no displacement of the tumour mass.

Treatment.—The patient was put on iodides without any relief of the symptoms. Later, he was put on sodii salicylas 2 drams a day for joint pains with considerable relief of symptoms. Deep x-ray therapy gave relief to the chest pain but no appreciable change in the tumour mass after a course of Roentgen therapeutic test dose.

This patient came again after a period of two years and was under my observation for over two months before he died. He had developed by that time cyanosis of the lips, a tendency to clubbing of the finger nails, but he had not lost any weight nor did he show any signs of wastage. He was comfortable when at rest. Even walking a few feet made him breathless. Clinical and radiological examinations were identical to the conditions that obtained nearly three years ago. The diagnosis in this case was mediastinal tumour. The diagnosis was based on pressure symptoms and the absence of pulsation on screening. The general condition of the patient was the same for nearly a period of three years. This ruled out the possibility of malignancy. The fact that the patient, when at rest, was fairly comfortable, and only exertion caused dyspnoea, was sufficient evidence of a space occupying benign tumour in the mediastinum (dermoid or a cyst). A very sharp outline of the tumour suggested the possibility of aneurysm, but was missed because his general condition after nearly three years

was not worse. The blood Wassermann being negative was also taken as a point against aneurysm. The rare possibility of the pulmonary artery aneurysm did not suggest itself clinically. Operation was decided upon under cyclopropane anaesthesia. Soon after anaesthesia was started, the patient turned intensely cyanotic and respiratory failure occurred.

At a partial autopsy the following features were noted :—

The heart was enlarged. The right auricle was dilated a little more than normal, and the musculature showed slight hypertrophy. Foramen ovale closed, tricuspid valves normal. The right ventricle was very much reduced and the wall much thickened, to nearly the thickness of a hypertrophied wall of the left ventricle (figure 6, plate IV). Thickness varied from 17.5 mm. to 23.5 mm. There was no defect in the inter-ventricular septum. The pulmonary valves were bicuspid and looked normal. Beyond the valve the left pulmonary artery was dilated to more than the size of a tennis ball. There was a communication between the pulmonary artery and aorta, widely dilated patent ductus arteriosus. Diameter of the patent ductus was 11.5 mm. The opening into the aorta was just distal to the origin of the left subclavian artery. There was a horse-shoe shaped septum from the roof of the aneurysm (figures 4 and 5, plate IV), the end of the septum arising 10 mm. above the pulmonary valves. The distance between the pillars of the septum was 45 mm. and the height from the wall to the free end of the septum measured 60 mm. Two explanations are offered for this septum. One is that it is the prolongation of the ductus free end into the aneurysm. The other is that the septum represents an aberrant pulmonary valve left behind during the development. But the histological appearance did not show any valvular element in the septum. It was the left pulmonary artery that was markedly dilated into an aneurysm. The aneurysm measured 10.45 cm. \times 8.4 \times 10 cm. and was compressing the left lung. Thickness of the wall of the aneurysm minus the thickness of the pericardium was 1.75 mm. On opening into the aneurysm sack it was found to contain only liquid blood. No laminated clot was present. The intima of the aneurysmal sack showed atheromatous patches and the patent ductus was healthy. Left auricle was normal and the wall of the ventricle showed some amount of hypertrophy. Thickness varied from 19.5 mm. to 20.5 mm. The aorta showed atheromatous changes near the origin of the left common carotid and left sub-clavian arteries. The aortic valves and cusps were normal. The aorta did not show any narrowing where the patent ductus opened into it or beyond it. The coronary arteries were normal. Right pulmonary artery was found to be moderately dilated and the diameter was 24 mm. The pericardium was thickened and adherent. Part

of the pericardium on the posterior aspect of the right auricle was markedly thickened and calcified.

Histological appearance of the wall of the pulmonary artery aneurysm did not show any evidence of rheumatic focus.

Discussion

This case very closely resembles the case reported by Wahl and Raymond. The patency of the ductus arteriosus was not evident during life. Patent ductus and pulmonary aneurysm have been recorded in the literature. The lack of pulsation, the negative Wassermann reaction, and the lack of signs and symptoms of the commoner aortic aneurysm, led one to diagnose a mediastinal tumour. Lack of wasting or cachexia led one to eliminate the possibility of malignancy. More importance ought to have been attached to the sharp outline in the x-ray picture and the subjective relief of symptoms the patient had with salicylates should have put one on guard. At the autopsy it was noted that there was no adhesion between the lung and the chest wall. It was aneurysm which had come in contact with the chest wall and given the false impression of an adherent lung after pneumothorax. It is noteworthy that the patient did not exhibit any of the symptoms associated with patent ductus. The lateral view of the chest was scrutinized after autopsy and an erosion of the rib could be made out.

The case was mistakenly diagnosed during life as a benign mediastinal tumour (? dermoid). Autopsy showed it to be a congenital anomaly. The other anomalies as patent foramen ovale and patent inter-ventricular septum were absent.

My thanks are due to Rao Bahadur Dr. T. Satakopan, Major F. A. B. Sheppard, I.M.S., and the Superintendent of the Government General Hospital, for permitting me to report this case, and to the Pathology Department staff (Madras Medical College), who helped me to study the specimen photographs of the same and the Radiology Department of the Barnard Institute of Radiology for helping me in the radiological work connected with this case.

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Fig. 1a.

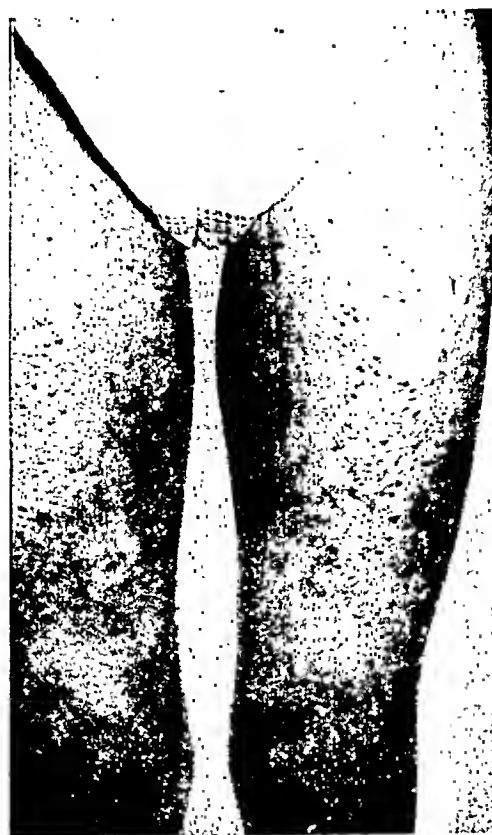


Fig. 1b.

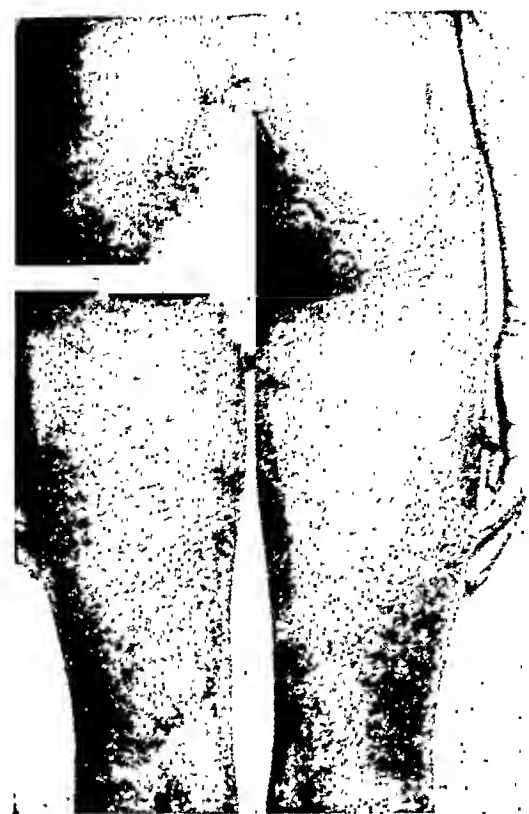


Fig. 2a.



Fig. 2b.



Fig. 3a.



Fig. 3b.



Fig. 4a.



Fig. 4b.



Fig. 5a.



Fig. 5b.



Fig. 5c.

OSTEO-SARCOMA OF CERVICAL SPINE
I. AHMAD. (M. H. P.) PAGE 23



Figure showing calcifying tumour growing from and destroying the left half of the 4th, 5th and 6th cervical vertebrae.

PLATE III

ANEURYSM OF THE PULMONARY ARTERY WITH PATENT DUCTUS ARTERIOSUS :
R. SUBRAMANIAM. (O. A.) PAGE 20



Fig. 1.—X-ray chest antero-posterior view showing the aneurysm to the left of the heart in continuation with the heart shadow.



Fig. 2.—Right oblique view showing (e) erosion of the rib. The picture also shows a barium swallow of the oesophagus with no deviation in the oesophagus.



Fig. 3.—Left oblique view of the chest showing that the tumour (aneurysm) is mainly to the left side of the chest.

PLATE IV

ANEURYSM OF THE PULMONARY ARTERY WITH PATENT DUCTUS ARTERIOSUS :
R. SUBRAMANIAM. (O. A.) PAGE 20



Fig. 4.—Front view of the specimen. (a) Aorta.
(s) Aneurysmal sac. (l) Lung.



Fig. 5.—Photo shows aneurysmal sac cut open to show the (s) septum described in the article. A bulb is put in the pulmonary valve to show the bicuspid nature. A glass tube is passed through the patent ductus.



Fig. 6.—A rear view of the specimen showing the markedly hypertrophied wall of the right ventricle (R.V.). Left ventricle (L.V.) is very much reduced in size

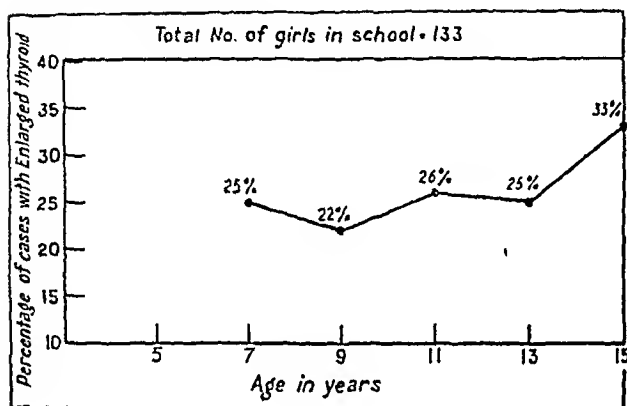
A Mirror of Hospital Practice

FŒTAL MALPRESENTATION IN A CASE OF SIMPLE GOITRE

By (Mrs.) I. DEVADAŞAN LYALL,
M.B., B.S. (Punjab), D.T.M. (Cal.)

Medical Officer in-charge, Clara Swain Hospital,
Methodist Mission, Bareilly, U. P.

THAT this place is in a goitrous district has not been reported previously. This fact was observed recently when a local school medical inspection was done, and a number of slight enlargement of thyroid cases noted without any symptoms whatsoever. A graph is given below showing the incidence of enlarged thyroid in different age groups.



Case report

With this study in the background, the following case is reported:—

Patient R. S. no. 928, age 18 years, was admitted on 7th August, 1946. She had a simple goitre, the size of an orange. Primigravida, full-term pregnant, had been in labour for 9 hours, membranes had ruptured 4 hours before admission and she had been examined by village dais.

On examination: Pelvis normal, head in the brim, partially engaged. Per vaginam, cervix 2 fingers dilated, membranes absent, brow felt.

A trial labour was given hoping that a deflexed head would flex and so would effect a normal delivery. Twelve hours later: Per abdomen progress nil; foetal heart indefinite. Per vaginam, cervix still 2 fingers dilated, canal completely taken up, head still not flexed. Duration of labour 21 hours. Cæsarean section done as non-dilatation of os prevented any form of delivery via natural passages and mother appeared exhausted.

A dead female infant was removed with enlarged thyroid gland, the size of a walnut. The bones of both forearms were bent. For lack of facilities, a radiological examination was not done, but clinically it was suggestive of rickets.

Mother recovered after a mildly febrile puerperium.

It is not justifiable to draw any conclusion from a single case report but attention may be drawn to the following points:—

1. A pregnant woman with enlarged so-called simple goitre is probably liable to have a delay in dilatation of cervix.

2. The foetus in a pregnant goitrous mother is liable to have enlargement of its thyroid, too.

3. A swelling in the neck, even as small as a walnut, may prevent flexion of head in foetus during labour.

4. Such a foetus tends to have some alteration in its metabolism, possibly in calcium deposition, making it liable to a condition like foetal rickets.

I thank the Superintendent of the Girls' School for allowing me to do the school medical inspection and for using the data. I thank the Superintendent and staff of the Clara Swain Hospital for their kind help in allowing me to observe, operate upon and follow up the case reported.

OSTEO-SARCOMA OF CERVICAL SPINE*

By ISRAR AHMAD, M.B., B.S.

Thomason Hospital, Agra

H. S., a Hindu male child, 11 years old, was admitted to hospital complaining of paralysis of both upper and lower limbs—duration two weeks.

The father stated that he injured his neck three months ago while playing. Three weeks later he developed paralysis, first of the left, and then of the right arm. Two weeks later the lower limbs were affected also. There was no difficulty in micturition or defæcation.

Examination revealed a hard, smooth, rounded swelling, the size of a large apple, occupying the front and left side of the neck and apparently growing from the cervical spine.

Quadriplegia was present.

X-ray examination showed a calcifying tumour growing from and destroying the left half of the 4th, 5th and 6th cervical vertebræ (see figure, plate II).

During his eight weeks' stay in hospital the tumour has grown visibly. After immobilization on a plaster of paris bed the paralysis in the limbs has improved and the patient can now move his upper limbs freely.

Operation being obviously out of the question, deep x-ray therapy was tried. Ten exposures

* Paper rearranged by J. A. S.

have been given so far without appreciable diminution in the size of the tumour.

I am very grateful to my chief, Major S. Ahmed, I.M.S., and also to Dr. H. N. Bhatt for taking the skiagram.

A CASE OF BRUCELLOSIS (ABORTUS FEVER)

By R. BHUYAN, L.M.P., L.T.M.

and

R. C. BARUA, L.M.P., L.T.M.

A. O. C. Hospital, Digboi, Assam

A PUNJABEE Hindu girl, aged 10½ years, was admitted to hospital on 26th July, 1946, with a history of fever for 3 days. The child developed fever on the day she arrived in Digboi from the Punjab where she had been staying for a period of 3 months on a holiday.

The temperature was of enteric type for first 3 weeks, then of undulant type; there was progressive splenic enlargement, and the bowels constipated at the beginning but regular after first 2 weeks. The child remained somewhat apathetic and dull when the temperature was high, otherwise looked fairly well. On the 12th week she developed painful swelling of left wrist joint, which subsided after 4 or 5 days with rest and fomentation. Headache, joint pain and poor appetite were the prominent symptoms.

Radiological examination of the chest on the 6th week showed no abnormality. Blood for malarial parasites, thick and thin films, was negative on several occasions. Widal and Weil-Felix reactions negative in a 1/250 dilution on the 10th and 15th day of illness. No tubercle bacilli were found after several examinations of 24 hours' sputum by concentrated method. Examination of fasting stomach contents for tubercle bacilli was also negative. Routine examinations of stool and urine were negative.

Blood picture during the 5th week of the illness was:—

W.B.C. .. 3,600 per c.mm.

R.B.C. .. 4,460,000 per c.mm.

Differential count:—

Eosino. .. Nil

Baso. .. Nil

Poly. .. 38 per cent

Lympho. .. 49 per cent

Large mono. .. 13 per cent

No L. D. bodies found in sternal marrow. On the finding of progressive enlargement of spleen a few bi-weekly diagnostic injections of urea stibamine were given up to a total of 0.75 gm., but no effect on the course of the disease was

apparent and consequently urea stibamine was discontinued. A course of 600,000 units of penicillin during the 6th week also did not appear beneficial.

On the 7th week agglutination tests and cultures for the *Brucella* organisms were done with the following results:—

$\frac{1}{25}$	$\frac{1}{50}$	$\frac{1}{125}$	$\frac{1}{250}$	$\frac{1}{1000}$	$\frac{1}{2000}$	$\frac{1}{5000}$
+	+	+	+	+	+	+

Concentrated agglutinable suspension (Standard) *Brucella abortus* was obtained from Central Military and Pathological Laboratory, Poona.

Primary blood culture on nutrient broth and subculture on agar media showed non-motile gram-negative cocco bacilli with the following biochemical reactions:—

Glucose	Maltose	Mannite	Lactose	Saccharose	Dulcitol
Nil	Nil	Nil	Nil	Nil	Nil

From the serological and cultural report the infection was diagnosed as brucellosis (abortus fever).

T.A.B. shocks (4 injections at intervals of 4 days) were given with no appreciable effect. A pentavalent antimony preparation (Fantarin—Glaxo) was also tried in doses of ½ c.c., 1 c.c. and 1½ c.c. on 3 consecutive days and 2 c.c. on the 5th day without any appreciable result.

The patient was discharged from hospital at the end of 13th week at the request of her parents. She became afebrile after two weeks' illness at home (i.e. after the 15th week of illness) and is now in perfect health, attending school and taking part in outdoor games.

Abortus fever is unknown as an indigenous disease in Assam and this was probably an imported case.

We wish to express our thanks to Dr. A. S. Prowse for his kind interest in the case and also to Mr. F. J. Valentine for kindly allowing us to publish this note.

DIAGNOSIS OF PRESUMPTIVE AMEBIC HEPATITIS IN A CHILD AGED TWO YEARS

By G. S. MOHAPATRA, M.B., B.S.

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MANSON-BAHR in 'Manson's Tropical Diseases' reports an English girl of sixteen as his youngest patient and mentions the records of an Egyptian child of three months and some children of India of ten years of age suffering from hepatic amebiasis. Barring these records of children under ten years of age suffering from

amœbic infection of liver are rare. The following case is of interest from clinical point of view :—

'B', a female child of two years of a well-to-do family, came under my treatment on 5th September, 1946, with the complaint of fever of one and a half months' duration. The fever was of a hectic type and a rise was always accompanied with profuse sweats.

History of illness.—A fortnight before the child was first discovered to have rise of temperature in the evening she had loose motions with blood and mucus varying from 5 to 10 times a day. With ordinary treatment for colitis, the motions came to normal and the child began to have rises of temperature first in the evening—the morning temperature being normal. Gradually as the severity increased, the temperature became remittent in type—evening and night temperature going up to 102 or 103°F., morning temperature coming down to 99.5 or 100°F. Previous to the ailment the child was quite hale and hearty without any complaints whatsoever.

The child was emaciated with a sallow complexion and was anæmic. Tongue was clean and moist, lips dry and cyanotic. Pulse was rapid with low volume and disproportionately high in comparison with temperature. Abdominal examination revealed enlargement of liver downwards by two fingers below the right costal margin and upwards by about half an inch. On pressure over the right hypochondrium, tenderness in the region could be elicited but there was no sign or symptom of acute pain in the region. Otherwise the abdomen was quite healthy with no mass or tympanitis, neither the spleen was palpable. There was absence of painful or enlarged gland in the system. Examination of chest revealed crepitation and diminished breath sounds at the base of the right lung. There was no cough. Record of temperature for one week showed a definite tendency to tertian periodicity.

Stool showed undigested food particles, a few degenerated red cells and pus cells. No cysts of amœbæ could be seen in spite of repeated examinations.

Urine was clear with no deposit, reaction acid, specific gravity 1.016, no abnormal constituents detected.

Blood—total red cells 3,100,000 per c.mm., white cells 9,375 per c.mm., polymorphonuclears 68.5 per cent, lymphocytes 25 per cent, large mononuclears 5.5 per cent, eosinophils 1 per cent, basophils nil. Malaria parasites not detected in spite of repeated examinations. Hæmoglobin 55 per cent.

Treatment.—As is often seen with such cases in adults, the child had been saturated with quinine, mepacrine and atabrine (Bayer) successively by practitioners before she came under my treatment. This was probably due to the tertian periodicity of the fever and partially to the absence of other positive findings. Other

treatments given were salicylates with urotropine, vitamins and 'livergen'.

After close observation and necessary examinations I injected $\frac{1}{4}$ grain of emetine with 1/200 grain of strychnine in 1 c.c. of distilled water intramuscularly on 15th September, 1946, at 1 p.m. The night temperature on the date rose to 105.6°F. but it gradually came down till it touched normal in the morning. The injections were repeated daily for eight days, thus giving a total dose of 2 grains. During the whole course the temperature kept normal and the child remained with me for seven days more as the bowels were not moving quite well. Usual diet was slowly resumed and the child was discharged. Up till 20th November, 1946, the child was keeping normal with steady increase of weight and colour.

Points to note in the case were the absence of any œdema or pain in the region of liver (even though the child had temperature for one month and a half prior to starting treatment), leucocytosis, general toxæmia and cough.

MENINGOCOCCAL TOXÆMIA ACCOMPANYING MALARIAL INFECTION

By R. C. BARUA, D.M.P., L.T.M.

Assistant Medical Officer, A. O. C. Hospital, Digboi, Assam

A CASE was admitted to the hospital with history of continuous fever for 3 days. Fever started with chill, rigor, headache and pain all over the limbs.

On examination :—

Temperature	.. 103°F.
Pulse	.. 120. Very feeble and practically imperceptible.
Heart sounds	.. Very feeble and muffled.
B.P.	.. 80/40.
Spleen and liver	.. Not palpable.
Respiration rate	.. 22 per minute.
Lungs	.. Nothing abnormal could be detected.
Blood	.. M.T. rings were found.

The diagnosis of malaria was made and he was put on quinine (7½ grs.) thrice daily.

In the evening the temperature went up to 102.8°F. with profuse sweating all over the body and the patient became deeply cyanosed. Respiration rate rose to 30 per minute. Pulse was practically imperceptible.

Treatment.—Coramine, glucose, berin and other stimulants were given and he was put on continuous oxygen inhalation by a double-nasal catheter.

Next day (fifth day of fever).—The temperature was 100°F. The patient did not show any improvement of his general condition. He was deeply cyanosed, restless with profuse sweating all over the body but retained consciousness.

All the tendon reflexes were normal. No rigidity of neck muscles, and Kernig's sign was negative.

Heart sounds were muffled with a soft systolic murmur in the mitral area.

Lungs.—Coarse crepitations were heard over both the bases with increased V.R.

Blood.—The thick film showed a few malignant tertian rings.

Total white count—15,000 per c.cm.

Differential count :—

Eosinophils	..	Nil
Basophils	..	Nil
Myelocytes	..	Nil
Juvenile	..	3 per cent
Band	..	13 " "
Polymorphonuclears	68	" "
Lymphocytes	..	12 " "
Large mononuclears	3	" "

Nothing abnormal was detected in the stool examination. Urine showed a trace of albumin and triple and amorphous phosphates.

Treatment was continued with quinine bihydrochloride by the intramuscular and oral route and berin, glucose and other stimulants.

Sulphadiazine was also given on account of the lung condition.

Sixth day.—There was not much improvement and the same treatment was continued.

The lungs on both the bases showed signs of definite pneumonic condition.

On the fifth day of illness blood culture was done which showed gram-negative diplococci in blood agar after 48 hours' incubation and was confirmed by sugar fermentation test.

Fermentation was seen only in dextrose and maltose with acid production with no change in mannite, saccharose, dulcitol and lactose.

From the cultural report it was confirmed that the organism was meningococcus. Oral sulphadiazine was substituted by Dagenan sodium intravenously and sulphapyridine by the oral route.

Nasopharyngeal swab was taken before pushing Dagenan to see if there was any focus of infection and on culture showed some streptococcus of the non-hæmolytic type.

Eighth day.—The patient showed much improvement of his general condition, cyanosis, profuse sweating and all the symptoms of toxæmia disappeared gradually after 8 hours. He was all right after 48 hours of sulphapyridine treatment.

Lumbar puncture was not done in this case due to low blood pressure which was only 75/40.

Comments.—The case was definitely of a malignant tertian infection with pneumonic consolidation of both lungs and the septicæmic conditions which were produced later on were thought to be due to pneumococcal infection.

But the profound cyanosis, restlessness and profuse sweating all over the body and one of the most noteworthy symptoms was that the patient did not lose his consciousness, along with

this the positive blood culture report for meningococcus are of interest. In this connection reference may be made to an article entitled 'Meningococcal adrenal syndromes and lesions' by H. Stanley Banks and J. E. McCartney (*Lancet*, i, June 19, 1943, p. 771) and to an article entitled 'Bilateral adrenal hæmorrhage' by J. Edgar Morison (*Ibid.*, p. 800).

We suspect from the symptoms and other investigations that probably partial hæmorrhage into the gland occurred in this case.

My grateful thanks are due to Dr. A. S. Prowse, C.M.O., and Dr. R. H. P. Clarke, D.C.M.O., for valuable guidance and help, and to my colleague Dr. T. T. Das.

Therapeutic Notes

NOTES ON SOME REMEDIES

V. SULPHONAMIDES

I

By R. N. CHAUDHURI, M.B. (Cal.), M.R.C.P. (Edin.),
T.D.D. (Wales), F.S.M.F.

Professor of Tropical Medicine, School of Tropical
Medicine, Calcutta

SINCE the epoch-making advance in chemotherapy was made in 1935 with the introduction of the sulphonamide group of drugs the literature on the subject has been so vast that it is difficult or almost impossible for the average practitioner to keep himself informed. Time therefore seems opportune to attempt a brief survey of the facts which have been evolved. Although lately somewhat overshadowed by penicillin, the sulphonamide drugs have still a wide field of application, particularly in our rural areas where the difficulty of storing penicillin and the need for frequent injections are real problems. In acute bacillary dysentery they have no rivals yet, and in certain other infections they are almost as good as penicillin.

Mode of Action

The action of sulphonamides upon susceptible micro-organisms is bacteriostatic, i.e. they prevent their growth and multiplication. Sulphonamides resemble chemically *p*-aminobenzoic acid which is an essential foodstuff for many bacteria. If the drug is presented to the bacterium in sufficient concentration the organism seizes upon it, but it is really no food. Its metabolism is retarded, it is unable to multiply and the battle is half won. Once the multiplication of bacteria is held in check, the leucocytes and other defence mechanisms of the body can come in and complete their destruction. Sulphonamides do not neutralize the bacterial toxins, nor do they stimulate the production of antibodies.

Organisms vary considerably in their susceptibility to the various drugs of the group, but this difference seems to be quantitative and not qualitative. For example, the fact that pneumococci and staphylococci respond better to sulphathiazole and sulphadiazine than to sulphanilamide is not due to their any specific action, but rather because there are more active compounds. In choosing a compound, however, not only its bacteriostatic power but also its physical and pharmacological properties have to be considered such as its absorption, excretion, solubility and toxic effects. Thus, sulphanilamide on account of its ready solubility is useful for local application; sulphadiazine produces particularly high blood concentration because of its slow excretion; sulphapyridine, though an excellent curative drug, frequently causes nausea and vomiting, while sulphaguanidine is effective against organisms in the lower part of the alimentary canal because it reaches this region in high concentration owing to its slow and incomplete absorption.

Absorption and Excretion

When taken by mouth, sulphonamides (except sulphaguanidine, succinyl-sulphathiazole and phthalyl-sulphathiazole) are more or less rapidly absorbed from the small intestine, depending on their solubility which is variable. The concentration in the blood reaches its maximum in three to four hours and then begins to fall owing to excretion which occurs almost entirely through the kidneys and which also varies with the drug used, but in most cases the greater part of it is eliminated within 24 hours, hence the need for giving it at regular intervals. With a dosage of 1 gm. given 4-hourly, the concentration may range from 5 to 10 mg. per 100 c.c. of blood or even higher and this is sufficient for most infections. Sulphaguanidine is only partly absorbed, while succinyl- and phthalyl-sulphathiazole are not absorbed except for trifling amounts; they are excreted in the faeces in high concentration.

After absorption the drug is found practically in all tissues and in all normal and pathological fluids of the body. In the liver part of it is conjugated with acetyl group, but the greater part remains free or unchanged. Both forms occur in the blood and urine. The acetylated part of the drug is therapeutically inactive. The amount of the drug which is acetylated varies with the different compounds and with the duration of its administration. The importance of the acetylated derivatives is that many of them are less soluble than the original compounds and that in passing out with the urine in which they appear in much higher concentration than in blood stream they tend to crystallize and so block the urinary passages. This is especially the case with sulphapyridine, sulphathiazole and sulphadiazine. It is therefore essential to ensure an adequate urinary outflow during sulphonamide therapy, especially if for any reason the flow is diminished (M.R.C., 1945).

Drugs in Common Use

Since the introduction of the sulphonamides into clinical medicine ten years ago, the therapeutic applications have greatly widened and a succession of new preparations has appeared, but only some 5 or 6 of them are in common use to-day. Sulphanilamide is the simplest member of the whole group and with it various chemical linkages have been prepared, and these possess curative action against bacterial infections insusceptible to sulphanilamide. None of them is perfect, each has its advantages and disadvantages which render it more suitable for some purposes than others. The following are briefly the chief properties of the common drugs :

Sulphanilamide is very soluble and is useful in streptococcal, meningococcal and coliform infections and also for local application. *Sulphacetamide*, also very soluble, is chiefly used for local application to delicate tissues such as the conjunctiva and in urinary infection. *Sulphapyridine*, though an efficient drug, has now been largely discontinued owing to high incidence of nausea and vomiting. *Sulphathiazole* is the most potent of sulphonamides and is effective against a wide range of infections. It is rapidly absorbed, and elimination is also rapid. Next to penicillin, it is the best of the sulphonamides for the treatment of staphylococcal infections, and though less soluble than sulphanilamide, it has greater bacteriostatic power when applied locally. *Sulphadiazine* has relatively low toxicity and has almost the same range of application as sulphathiazole. It is preferred in pneumococcal and meningococcal infections. As it is slowly absorbed from the intestine, treatment in acute cases should be initiated by an intravenous sulphonamide. Both *sulphamezathine* and *sulphamerazine* are derivatives of sulphadiazine but less toxic; the former is probably the least toxic of the sulphonamides except sulphacetamide but is rapidly excreted, while the latter being slowly excreted gives a higher and more constant blood level than any other sulphonamide in the same dosage, hence it may be administered in somewhat smaller doses. *Sulphaguanidine* and *succinyl-sulphathiazole* (*sulphasuxidine*) are used exclusively for bowel infection by the dysenteric group of organisms. The last one is of particular value in the treatment of dysentery carriers and in reducing the number of *B. coli* in the intestine. The newer drug, *phthalyl-sulphathiazole* (*sulphathalidine*), is said to be two to four times as effective as succinyl-sulphathiazole but reports on it are still scanty.

In the choice of drugs there is yet no unanimity, but the following list slightly modified from Anderson and Snodgrass (Dunlop *et al.*, 1946) will be found generally useful. When the nature of the infection is not known, the choice will rest between sulphathiazole, sulphadiazine and sulphamezathine.

Infection	1st choice	2nd choice
Streptococcal	Sulphanilamide	Sulphathiazole
Pneumococcal	Sulphadiazine	Sulphathiazole
	Sulphamezathine	
Meningococcal	Sulphadiazine	Sulphanilamide
Gonococcal	Sulphathiazole	Sulphadiazine
Staphylococcal	Sulphathiazole	..
	Sulphadiazine	
Dysenteric	Sulphaguanidine	..
	Sulphadiazine	
Coliform	Sulphanilamide	Sulphathiazole
Others (e.g. <i>Cl. welchii</i>).	Sulphadiazine	Sulphamezathine
	Sulphathiazole	

Methods of Administration and Dosage

1. *Oral administration.*—The drugs are usually supplied in tablet form in most cases, each tablet containing 0.5 gm. The tablets should be crushed and taken with 2 or 3 ounces of water, otherwise they may be passed out unabsorbed (Chaudhuri and Ghosh, 1945). In acute cases it is important to start treatment with a large initial dose (2 gm.) in order to raise the blood concentration as rapidly as possible and in very ill patients this or part of it (e.g. 1 gm.) should be given intravenously. Apart from this initial injection, the drug should, wherever possible, be given by mouth. It is continued in one gramme doses given every 4 hours till the temperature settles and there is clinical improvement, and then in smaller doses for a further 2 to 3 days. With each tablet a mixture containing sodium bicarbonate and sodium citrate, each 20 grains, is given. Each dose and its time of administration should be recorded on a chart. It must not be stopped too soon because of the risk of recurrence, nor should it be continued too long for fear of causing toxic symptoms, a course of 7 days being generally sufficient; only occasionally, as in meningitis and septicæmia, will it be necessary to extend this period. In comatose patients the drug may be given by a nasal tube, well diluted with water or milk. Children tolerate the drug better than adults.

If there is no definite improvement within 3 or 4 days of treatment, the blood level should be checked, and if it is below 3 to 4 mg. per 100 c.c., dosage should be increased or few doses given intravenously. On the other hand, if it is adequate, the infecting organism is probably insensitive. This insensitivity may be absolute when it is useless to continue the drug, or relative when bigger dose or a change to a more active compound may be tried. When blood tests cannot be carried out it is better to discontinue the drug if no response is obtained within the fourth or fifth day of the drug.

The following schedule of dosage is recommended for Indian patients of average build and is applicable to all the drugs except sulphaguanidine and succinyl- and phthalyl-sulphathiazole. The table is intended for general guidance and the dosage may have to be modified to suit the individual patient or the special

properties of the drug given. When the infection is very heavy, the individual doses may be increased especially during the first 24 hours of treatment.

Age group, years	Initial dose	Four-hourly dose
0-3	0.5 gm.	0.25 gm.
4-10	1.0 "	0.5 "
11-15	1.5 "	0.75 "
Over 15	2.0 "	1.0 "

The three drugs solely used in intestinal infections are always given by mouth. Ordinary daily doses of sulphaguanidine and succinyl-sulphathiazole are 6 to 12 gm. for adults and 3 to 6 gm. for infants and children, while in the case of phthalyl-sulphathiazole 3 to 4 gm. have been found to be sufficient daily dose.

In subacute infections it is not necessary to give the intravenous injection and the dose is slightly reduced though some clinicians use the same amount as in acute cases. In urinary infections smaller doses (3 to 4 gm. a day) need be given than in general infections since the concentrations of the drugs in the urine are much higher than in the blood.

2. *Parenteral administration.*—This is indicated when it is desired to rapidly raise the blood concentration or when the oral route is impracticable. Intravenous injections are to be preferred and they may have to be repeated in case of vomiting or sustained coma. The sodium salts of the drugs which are readily soluble in water are used. These solutions, being alkaline, are irritant to the tissues and liable to cause necrosis but can safely be injected intravenously, provided care is taken not to let the fluid escape outside the vein. The contents of an ampoule (1.0 gm.) are drawn into a syringe containing 10 c.c. of either sterilized distilled water or normal saline and are injected very slowly into a vein. Alternately, one of the soluble forms of sulphanilamide available in the market may be used, e.g. sulphanilamide L.S.F. and solu-septasine; as these are non-irritant to the tissues they can be injected subcutaneously, intramuscularly or intravenously, but they are less potent. The sodium salts must not be injected subcutaneously or intrathecally.

When oral or intravenous routes are impossible as in dangerously ill patients with collapsed or very small veins, intramuscular injection is permissible; it must be deep and well away from important nerves as these are particularly liable to damage from the highly alkaline solution. The vastus externus is the muscle recommended, and the injections must be spaced at distances of at least 3 inches from one another.

3. *Local application.*—Sulphanilamide and sulphathiazole are the two substances that have been mostly used in skin diseases, burns and wounds or in peritonitis. The tablets as used for oral administration must not be used for this

purpose, but pure sterile powder in ampoules or special containers is available in the market.

Sulphonamide Resistance

An important cause for lack of response in treatment is the development of resistance of the bacteria to the action of the sulphonamides. This occurs when small and ineffective doses are given for prolonged period, particularly in infections due to pneumococci, gonococci, streptococci, *B. coli* and dysentery bacilli. When it occurs, it extends to all compounds of the group, although an organism which resists the weaker action of sulphanilamide may succumb to a more active substitute such as sulphathiazole. Once a strain has become unusually resistant, it can maintain its resistance for long periods and be propagated with the virulence of the parent strains. Apart from this acquired resistance, strains are occasionally met with which are naturally insensitive to the sulphonamides. But it should be remembered that in sulphonamide therapy the patient's resistance counts as much as the drug and the bacterium and if it is poor, then the drug may well fail.

When sulphonamide resistance does occur, there will be absence of the expected clinical response and this may be confirmed by laboratory tests. Every effort should be made to avoid producing it by faulty therapy and intensive courses of treatment should be given from the beginning except for special purposes, as then the development of drug resistance is unlikely. Too gloomy a view should not be taken of the difficulties which sulphonamide resistance may cause, the great majority of infections still respond to the drug and luckily the resistance does not extend to the bacteriostatic compounds of a different type such as penicillin.

Incompatibles

The inhibitory action of sulphonamides on bacterial growth can be neutralized by small quantities of *p*-aminobenzoic acid and a number of local anaesthetics chemically allied to it such as procaine, benzocaine and orthocaine. This has obvious clinical application in infected cases under sulphonamide therapy and requiring local anaesthetic. While occasional small doses seem to have no effect on the therapeutic value, massive or repeated doses of procaine may weaken the effect of the drug and may even be dangerous especially in the early stages of the therapy and more particularly in those cases not receiving intensive treatment. de Waal *et al.* (1942) suggest the use of not more than 10 c.c. of a 3 per cent solution of procaine (or correspondingly greater amounts of a weaker solution)—a dose which should be sufficient in minor surgical operation. When a large amount of a local anaesthetic is required under these conditions, one of the drugs not allied to *p*-aminobenzoic acid like stovaine, nupercaine and eucaine should be used.

Substances antagonistic to sulphonamides also occur in pus and necrotic tissue, consequently

the drugs exert less effect than usual if they are applied to wounds containing pus or sloughs. In the early days of sulphonamide therapy it was customary to forbid sulphur-containing food and drugs concurrently as predisposing to the development of cyanosis, but this view has been shown to be unfounded. Sulphonamides and quinine should not be given simultaneously as the combination is said to be toxic. Sulphonamides and mepacrine may, however, be given at the same time.

Toxic Effects

These effects are not common, considering the widespread use of sulphonamides. The following are the more important of them :—

1. *Headache, nausea, vomiting or malaise.*—These are early symptoms but usually of little importance. Restlessness and inability to concentrate may also be present. Vomiting is more frequent with sulphapyridine and rare with sulphathiazole or sulphadiazine. Should it persist, the drug should be changed or administered parenterally.

2. *Cyanosis.*—This occurs more often with sulphanilamide, and is usually due to the formation of methæmoglobin in the blood. It is of no clinical importance except in anæmic patients, but if it is causing alarm to the patient's friends, it can be cured in 15 to 30 minutes by intravenous administration of 10 c.c.m. of 1 per cent solution of methylene blue, or in 3 to 4 hours by giving 200 mg. by mouth. Thionin stain can be used in the same way. A very rare but dangerous form is that caused by sulphæmoglobin, it is unaffected by methylene blue, and may persist for several weeks.

3. *Hypersensitivity.*—The most important reactions are skin rashes and drug fever and seem to be due to some kind of acquired hypersensitivity developed during a previous course of treatment or during the earlier stages of the same treatment. Sulphathiazole seems especially liable to produce these manifestations. The most common form of *skin rashes* is a discrete papular erythematous rash, often accompanied by fever and severe itching. It appears about the tenth day, but in patients who have previously had the drugs it may appear much earlier, sometimes within a few hours of the first dose. The rash clears up quickly with the stoppage of the drug, but as it may be a prelude to more serious complications, a leucocyte count should be made. Sensitivity may also develop after continued long application of sulphonamide ointments for skin infections, leading to both local and general reactions such as eczema, pruritus and fever.

Drug fever may appear in 2 or 3 ways. The original pyrexia may be prolonged or it may quickly subside followed after a day or two by its reappearance, but by far the most common form of fever occurs later, *i.e.* about the tenth day and is seen when sulphonamide is being given for the first time. The temperature rises to 102°F.

or more, frequently associated with rigors, and there may be vomiting and pain and swelling of joints with polymorphonuclear leucocytosis. The difficulty is to exclude recrudescence or relapse of the original infection. Drug fever should be suspected when (1) a rise of temperature cannot be adequately explained by the physical signs, (2) there is already definite improvement in the general clinical condition, and (3) omission of the drug brings about a fall in temperature though not always abruptly. On the other hand, a rise of temperature occurring a few days after stopping the drug is usually due to a recrudescence of the infection.

Generally speaking, these complications are encountered most frequently when therapy is prolonged but although personal idiosyncrasy seems to play a part in their production prevention is assisted by not continuing the drug longer than is necessary, usually stopping the therapy by the seventh day in all but exceptional cases. When they do occur the best course is to stop the drug, but if the complication arises early and in the form of fever only, a careful clinical survey of the case is needed before it is stopped prematurely. As a preventive, it has been recommended that a patient who has previously suffered from hypersensitivity should, if he is to receive sulphonamide again, be given a different compound from the one used during the first course.

4. *Blood changes.*—A minor degree of anæmia is common but is more often due to the disease than the drug. The changes may manifest as purpura, aplastic and acute hæmolytic anæmia or agranulocytosis, the latter being the commonest of these rare complications. The occurrence of unexplained fever, slight jaundice or a sore throat should arouse suspicion. Acute hæmolytic anæmia is a dangerous complication and the symptoms may set in at alarming speed. It has been reported most often after sulphanilamide and more frequently in children than in adults. Agranulocytosis is another serious complication which seems to depend more on the duration of treatment (it is rare before the fourteenth day of therapy) than on the total dosage. Purpura in association with this condition is of grave import.

The occurrence of these blood changes is an absolute indication for stopping the drugs. Although careless use of the drugs for long periods predispose to them, prevention is not always easy owing to personal idiosyncrasy in some patients. When massive doses are given or when treatment is continued for more than seven or eight days the hæmoglobin and white blood cells should be examined regularly. If the hæmoglobin falls below 40 per cent or the total white cell count is under 3,000 per c.mm., treatment should be immediately discontinued. When these complications develop necessary appropriate treatment should be given.

5. *Renal irritation and urinary suppression.*—As already mentioned, the less soluble sulphona-

mides and their acetyl derivatives are liable to deposit crystals which may cause irritation and even go to the extent of blocking the urinary passages. It is therefore essential to give ample fluids so as to secure a good flow of urine; as a general rule, a pint of fluid should be given for each gramme of the drug up to six pints a day, the aim being to maintain an urinary output of about 50 ounces in an adult. It is also desirable to keep the urine alkaline by giving a mixture of sodium bicarbonate and sodium citrate as already recommended, since the sulphonamides and their acetyl derivatives are more soluble in alkaline than in acid urine, though this is not always easy with the highly acid urine of the febrile states. The urine should be inspected (for suspicious blood) and measured daily and whenever possible it should be examined microscopically on the third or fourth day. The finding of crystals or blood is no contraindication to the continuation of the therapy, but it is a warning for caution.

If renal pain, macroscopic hæmaturia or oliguria occurs, the drug should be stopped at once and fluids by mouth must be forced and intravenous injection of one pint of saline and glucose should be given. But a large fluid intake is harmful if the urinary flow is not established within 4 to 6 hours as it causes œdema of the lungs. Heat should be applied to the loins. In most cases these measures are sufficient, but if anuria persists for 12 hours or if oliguria (less than about 15 oz.) persists for 24 hours, ureteric catheterization and lavage or other surgical procedures will have to be carried out, and for this a surgical specialist should be consulted. But before doing this it is worth applying massage to the lower end of the ureter by rectum, as the blockage often occurs in this part of the urinary passage. Flynn (1943) has successfully treated some cases of sulphonamide anuria in this way. 'With the patient in the knee-elbow position, the ureteric openings into the bladder (three-quarter of an inch to 1½ inches above and to the outer side of the prostate) are massaged per rectum. The ureters enter the bladder at a point one-third of the way up the seminal vesicle on the outer side, and crystals are commonly formed at this site. Massage over the kidneys and ureters is then performed from above downward with the patient lying on the back; two or three minutes per side is usually sufficient'.

[To be continued.]

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Indian Medical Gazette

JANUARY

THE IRRESISTIBLE IMPULSE

Freedom from criminal responsibility.—Such a freedom in English law is accorded under the McNaughten Rules. These rules are incorporated in Indian law also.

The rules were framed after the McNaughten trial in 1843 and have not been revised (an attempt in 1924 failed). McNaughten had killed a Mr. Drummond, a Secretary of Sir Robert Peel, the then Prime Minister of England. He had mistaken the Secretary for the Prime Minister himself for whom he had lain in wait. He had been acquitted on the medical evidence of insanity. The acquittal had not been received favourably by the public. The House of Lords then had put certain questions to a full bench of 14 of Her Majesty's judges. Their Lordships' answers became known as the McNaughten Rules.

According to the rules, if a person because of his disordered mental state was unable to distinguish between right and wrong at the time of doing an act which would have been criminal when done by a mentally normal person, he is not guilty. He has no criminal responsibility.

Diminished responsibility.—Can a person, instead of having no responsibility, have a diminished responsibility? Medically, no reasonable doubts can be entertained against such a possibility. Medical profession recognizes disorders of behaviours, falling short of certifiable insanity, in certain diseases. Medical boards disqualify for state service persons suffering from such diseases. Recently in Scotland such a defence has been admitted (Smith, 1943). 'In the case of *Rex v. Savage*, Lord Alness stated that the law had come to recognize those who, while they may not merit the description of being insane, were nevertheless in a condition as to reduce the quality of their act from murder to culpable homicide' (Glaister, 1942).

Irresistible impulse.—Another grade in the downward path of a person's volition is the domination by an irresistible impulse. Is a person, at times, unable to control his doing of a wrongful or criminal act (which he knows to be wrong and criminal)? The English law is definitely against such a possibility or at least against giving the wrongdoer an advantage under it. 'At the hearing of the appeal of *Kopsch*, the Lord Chief Justice said that the fantastic theory of uncontrollable impulse was not yet part of the criminal law, and it was to be hoped that the time was very far distant when it would be made so' (Glaister, *loc. cit.*).

The same view is held in Canada (Meredith, 1946) and probably elsewhere in the British Empire.

On the other hand, some 17 States in U.S.A. (Werhofin, quoted by Meredith, *loc. cit.*) while retaining the original right-and-wrong test admit the defence of irresistible impulse.

It should be emphasized that the McNaughten Rules were framed in the last century before psychiatry was born, that insanity can impair emotion without altering (appreciably) intellect and that an unaltered intellect can be governed by an impaired will. When a plea of insanity is advanced in a capital charge the expert should state these facts (together with those of altered behaviours, falling short of certifiable insanity, if necessary) for the benefit of the jury. Even if the plea fails, due to a rigid adherence to the McNaughten Rules by the judge, the accused will receive the benefit of another examination by another expert after conviction but before execution which may thus be barred by the finding by the expert (Yellowlees, 1946).

The real difficulty in the recognition of the existence of the irresistible impulse appears to be one of proof: How is it to be decided whether the impulse was irresistible or simply unresisted? This should be a matter of evidence, ordinary as well as expert. The latest developments in electro-encephalography may help.

In India the plea of a fit of impulsive insanity was considered in the case of *Matin Ali* (*Leader*, 25th September, 1933; quoted by Modi, 1943). This young man with a friend engaged a taxi from Nagpur to Chindwara, while returning shot dead the owner and the cleaner, and absconded. He was arrested on the fourth day of the occurrence. For this double murder he was sentenced to transportation for life by the Sessions Judge of Chindwara. On appeal the Judicial Commissioner observed that although the acts did not fall under S.84 I.P.C. (Act of a person of unsound mind) but under S. 302 I.P.C. (Murder), yet they deserved indulgent considerations, as they were committed in a fit of impulsive insanity, without motive or premeditation, by a young man who belonged to a good family and had received higher education.

Resistible impulse made irresistible by unusually strong incitement.—Such a transformation undoubtedly occurs when political slogans and fanatical war-cries turn respectable, law-abiding and God-fearing citizens into hooligans and fratrieides. This point deserves special consideration in India where criminals, unlike their homologues in Europe, are known to be impulsive rather than cold-blooded designers of antisocial activities (Owens, 1935).

Resistible impulse made irresistible by a lowered resistance of the body, by age.—That due to advances in nutrition, therapeutics and economics the expectation of life has increased after World War I is well known. As a result more elderly persons are alive to-day than

ever before in history. Some of them are committing crimes for the first time. Should they be punished as an ordinary young offender is punished or should a senile offender be recognized as the juvenile offender has been recognized?

It is admitted that even when the concession for bodily defects and lack of suitable social surroundings has been made a fair number of the offenders may turn out to be just wicked old men who are misusing their knowledge of the world and mankind, and their leisure. Such men are known to mythology and do not appear to have been assets to their communities, in the light of to-day. Many, however, will be spared the indignities from which age should be exempt and, when corrected, will give the society in return, as reformed elders, the benefit of their experience of a long life in a busy world.

Immunity from punishment of the impulsive antisocial elements not advocated.—Even acknowledgedly insane inmates of lunatic asylums are not altogether immune from punishments which are provided for in the rules of the asylums. All antisocial elements should be collected, detained and corrected. Some of them may even be liquidated by euthanasia, if necessary, as a matter of expediency. A distinction, however, must be made between the hopeless and the helpless.

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Medical News

WORLD HEALTH ORGANIZATION

SECOND SESSION OF THE INTERIM COMMISSION,
GENEVA, 4TH TO 13TH NOVEMBER, 1946

(From a press communique issued by the United Nations, dated Geneva, 7th November, 1946)

'The attainment by all peoples of the highest possible level of health' is the objective assigned to the World Health Organization by its Constitution. The importance of this objective scarcely calls for proof; were one required, it could be found in the speed with which the new world organization is taking shape and

the fact that many personalities in the first ranks of science and health administration are devoting their efforts to it. It was in June-July of this year that more than 60 States who took part in the World Health Conference pledged themselves to create a new organization which would take over all health activities of other existing international organizations. The aim is to bring about a single organization whose task it will be to foster every activity which might contribute to the improvement and maintenance of health, to encourage the efforts each Government is making on behalf of its own nationals, to co-ordinate their efforts, and to enable scientists as well as public health officials to profit from experience acquired in other countries.

The forerunners

The necessity for an international organization of this kind has long been recognized. As long ago as 1907 the International Public Health Office was created, having its seat in Paris, with the task of preparing and administering international quarantine conventions.

At the end of the first World War the League of Nations in its turn established its Health Organization to fight the formidable epidemics of typhus fever, relapsing fever, cholera and smallpox then ravaging eastern Europe. A sanitary cordon established on Poland's eastern boundaries and technical help furnished to threatened countries protected central and western Europe from this scourge. During the years that followed, this Organization, with its headquarters at Geneva, helped at their request the health authorities of certain countries to improve and modernize their services with the collaboration of international experts and the advice of *ad hoc* committees. In concentrating and co-ordinating the work of scientists the world over, the technical committees of the League of Nations made their contribution to the progress of medical science and its practical application to the prevention of disease. Whether in the field of epidemiology, standardization of biological products, tuberculosis, cancer, typhus fever, malaria, sleeping-sickness, child welfare, nutrition, rural hygiene and many other subjects, the importance of their work is denied by none.

During the second World War, foreseeing the possibility of new epidemics in its aftermath, the United Nations entrusted its Relief and Rehabilitation Association (UNRRA) with the task of aiding devastated countries in their anti-epidemic struggle and in the reorganization of their national public health services.

Their amalgamation

At its first session held in February 1946, the Economic and Social Council decided on the fusion of these three international organizations dealing with public health into a new World Health Organization whose charter was drawn up subsequently by the International Health Conference at New York. This Conference decided on the dissolution of the International Public Health Office (Office international d'Hygiène publique) and on the taking over by its new World Health Organization of the health activities of both UNRRA and the League of Nations. Pending ratification of the Final Acts it had drawn up and adopted, the Conference established an Interim Commission which would take the necessary steps to start the Organization—which is to be a specialized agency of the United Nations—working. The first session of the Interim Commission took place in New York (immediately after the Conference) and presented the Economic and Social Council with a report which was examined and approved; the second session of the Commission was held in Geneva from 4th to 13th November, to find a solution of those administrative and financial problems which could then be settled.

The second session

With Dr. Andrija Stampar (Yugoslavia), Rector of Zagreb University and Chairman of the Economic and Social Council of the United Nations, in the Chair, the Interim Commission set up working committees on administration and finance, on relations with other

organizations, and on epidemiological and quarantine problems. The Chairmen of these committees were, respectively, Dr. van den Berg, Director-General of Public Health of the Netherlands, Dr. Aly Tewfik Chouha Pacha, Under-Secretary of State in the Egyptian Ministry of Public Health, and Dr. Mackenzie, Senior Medical Officer of the Ministry of Health of the United Kingdom. Of the work accomplished by these committees, which was approved in plenary session, the following decisions should be recorded:

Various agreements were drawn up to establish relations and methods of liaison with the qualified organs of the United Nations, in connection with WHO's situation as a specialized agency (reciprocal representation at meetings, exchange of information, implementing of recommendations, mutual assistance in different fields, e.g. public relations, publications, etc.). The World Health Organization will report more particularly to the Economic and Social Council, and may be entrusted with items interesting the Security Council and the Trusteeship Council; the Permanent Court of International Justice can also apply to it for its opinion.

Principles of liaison and co-operation between WHO and other specialized agencies have, moreover, also been adopted. Collaboration is for instance envisaged with the International Labour Office (ILO), the Food and Agriculture Organization of the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the Provisional International Civil Aviation Organization (PICA). Steps have also been taken to establish relations with various non-governmental national or international organizations interested in public health. Finally negotiations are under way for the integration of the Pan-American Sanitary Organization with the World Health Organization.

Budget

The budget for the end of 1946 was reviewed, the credit of \$300,000 being far from exhausted. The budget for 1947 amounts to \$1 million, to which sum should be added the figure of \$1 and a half million gifted by UNRRA for the continuation by WHO of its health work. While taking into account these financial assets and the degree of urgency of each task, the Interim Commission will at once tackle the effective work which should lead to the realization of the aim it has set itself to achieve. This programme of work includes the following points:—

The coming tasks

As regards epidemiological information, the work hitherto performed by the League of Nations has already been taken over and that of the International Public Health Office (Office international d'Hygiène publique) and of UNRRA will be absorbed in less than a month's time. The setting up of a Quarantine Committee has been decided upon, which is to consist of nine members, whose task it will be to supervise the application of the international sanitary conventions. It can count upon the advice of a sub-committee of seven experts on yellow fever.

For the standardization of sera and certain drugs a Nuclear Committee of Experts on Biological Standardization will study, pending the setting up of a larger committee, which are the most urgent problems to be taken up.

From the beginning of next year UNRRA's health activities will be taken over; notably as regards its work against malaria and tuberculosis in Greece, the training of local personnel in sanitation and health work in Ethiopia and China, and various other projects such as the granting of fellowships and the despatch of expert missions to countries with special needs.

An expert committee will deal with the revision of the International Nomenclature of Diseases. A committee of experts with technical knowledge of the pharmacology of narcotics and drug addiction will be

set up to advise the Commission on any question which may be submitted to it by the Drug Supervisory Body. The creation of a technical preparatory committee on malaria has been decided on. Various other problems were touched upon as calling for study at a later date; technical formation of sanitary personnel, organization of the health services of certain countries, methods of combating venereal disease and post-vaccinal encephalitis.

The Commission also approved the programme drawn up for publications.

The headquarters of WHO

The question of the permanent seat of WHO was discussed, as a result of which a committee of five members (Canada, Egypt, India, Mexico and Norway) was entrusted with the task of examining the position and reporting back to the Interim Commission which will, in turn, refer the question to the forthcoming World Health Assembly, the date of which has not yet been decided upon but will probably meet next summer as it is likely that by that time the requisite number of ratifications will have been received.

Until then the Executive Secretary and his staff will have to carry out the work entailed by the decisions taken at present and prepare for the next session of the Interim Commission, which is to take place in Geneva on 31st March, 1947. A decision regarding the headquarters of the Interim Commission was made in the following terms:

'The Interim Commission:

(1) Takes note of the establishment of a headquarters office in New York capable of assuring indispensable liaison with the United Nations, and the fulfilment of other functions of the Interim Commission;

(2) Authorizes its Executive Secretary to set up an office in Geneva in order to facilitate the activities of the Interim Commission;

(3) Authorizes its Executive Secretary, in agreement with the Chairman of the Interim Commission, to set up offices in other places if it will be indispensable for other activities.'

Conclusion

As can be seen, the second session of the Interim Commission has in large measure completed the preparatory work and a stride has been made towards the effective realization of the aims of WHO.

In conclusion, we would like to mention the names of the personalities who took part in the work of the Commission. It will be seen from their qualifications that in most cases they are members of Governments or high officials directing the health services of their countries. The States Members of the Interim Commission were represented as follows:

Dr. G. M. Redshaw, Chief Medical Officer for Australia; Dr. G. H. de Paula Souza, Director of the Public Health Faculty of Brazil; Dr. Brooke Claxton, Minister of National Health and Welfare of Canada, assisted by Dr. T. C. Routley; Dr. Sze-ming Sze, Resident Representative in Washington of the National Health Administration of China; Dr. Aly Tewfik Chouha Pacha, Under-Secretary of State at the Ministry of Public Health, Cairo, Egypt; Dr. A. Cavaillon, Secretary-General of the Ministry of Public Health, France, assisted by Drs. L. Bernard and H. Y. Santer; Major O. Mani, Deputy, Public Health Commission, New Delhi, India; Dr. J. Togba, Department of State, Liberia; Dr. M. Martinez-Baez, Chief Health Officer, Mexico; Dr. C. van den Berg, Director-General of Public Health, Netherlands, assisted by Dr. W. A. Timmerman, Director of the National Institute of Public Health; Dr. K. Evang, Director-General of Public Health in Norway; Dr. M. Mackenzie, Senior Medical Officer, Ministry of Health, and Dr. W. H. Kaantze, Chief Medical Adviser at the Colonial Office, United Kingdom; Surgeon-General T. Parran, Director of the Public Health Service of the U.S., assisted by Dr. H. van Zile Hyde; Dr. F. G. Krotkov, Deputy Minister of Public Health of the U.S.S.R.; Drs. A. Gabaldon and D. Curiel, respectively Chief of the

Malaria Division and Chief of the Division of Epidemiology and Vital Statistics of the Ministry of Health and Social Welfare; and Dr. A. Stampar, Rector of Zagreb University, assisted by Dr. D. Juzbasic, Professor at the Medical Institute of Skopljje, Yugoslavia.

International organizations were represented by Mr. G. E. Yates, Secretary to ECOSOC and Dr. J. Lucas of the Trusteeship Division, for the United Nations; Dr. M. T. Morgan, President of the Permanent Committee and Dr. L. Gaud, President of the Commission on Finance and Transfer, for the International Public Health Office (Office international d'Hygiène publique); Dr. N. Goodman, Director of the European Health Division, for UNRRA, and Dr. A. A. Moll, Secretary, for the Pan-American Sanitary Bureau. The Secretariat of the Interim Commission was represented by its Executive Secretary, Dr. G. Brock Chisholm, former Deputy Minister of Health for Canada, and Dr. Y. Biraud, Deputy Executive Secretary, former head of the Epidemiological Intelligence Service of the League of Nations.

CENTENARY OF ANÆSTHESIA CELEBRATED IN AUSTRALIA

MUSEUM OPENED IN MELBOURNE

By LEN BARKER

(Abstracted from Release No. MNL/110 offered by the Public Relations Officer, Australian High Commissioner's Office, New Delhi.)

THE 100th anniversary of the first successful public use of a general anæsthetic was celebrated in Melbourne (Australia) by the opening of a museum of anæsthesia at Melbourne University. The only other known museums of its kind are in New York and London.

Established by the Australian Society of Anæsthetists, the museum was opened on 16th October, 1946. It is not intended to be merely an exhibition of relics, but a modern school of instruction where the history of anæsthesia is traced and the student of anæsthesia is shown models or replicas of the different instruments and drugs used since the technique was discovered, and the reasons for their subsequent abandonment.

The founders of the museum have taken great pains to obtain many original or models of instruments invented after Dr. W. T. G. Morton, a Boston dentist, first publicly demonstrated his anæsthesia technique. The collection naturally begins with a model of Dr. Morton's instrument, a glass bowl with a beer cask tap fitted on the side. Ether was introduced to the bowl through a wide aperture which also served as an air inlet. When the end of the tap was inserted in the patient's mouth, he breathed ether. The flow of air through the bowl was uncontrolled, however, so the amount of ether absorbed by the patient could not be adequately gauged.

Nevertheless, it was a revolutionary step from earlier crude methods of analgesia, when doctors used alcohol and force to subdue patients undergoing operations.

Just as primitive were methods in vogue during the days of Nelson. The victim was plied with rum in which tobacco had been soaked. The rum took the sharp edge off pain and the tobacco made the patient so sick that he relaxed, and did not offer much opposition to the surgeon.

Judged by the general progress since those days, methods of anæsthesia in use in some Continental countries as late as the outbreak of World War II were astoundingly backward.

Instruments captured by the Australian army from the Italians in Tobruk, and now on view in Melbourne's museum of anæsthesia, give some indication of the antiquated practices used in the Italian army.

Perhaps the most primitive of them is a wooden mouth screw used to open the mouth to prevent asphyxiation during anæsthesia. The point of the screw was thrust between the teeth and twisted!

An ether mask described by the museum as the 'worst in the world' is another archaic instrument captured from the Italians. It is a large mask very similar to a baseball mask with an oil silk cover. Ether was poured through a small hole in the top and the mask's design ensured that little oxygen reached the patient, resulting in anæsthesia by asphyxiation as well as drugs.

Anæsthesia as a speciality in Australia began in the early 1900's, although ether was in use in Australian cities one year after Morton successfully displayed his method.

Even earlier, Dr. E. H. Embley, an Australian general practitioner with a flair for experimental work, was concentrating on anæsthesia research.

In 1900 the safety of chloroform compared to other anæsthetics was a contentious question, which was studied by a commission sponsored by the Nizam of Hyderabad in 1889. It found that the danger of chloroform was that it caused failure of respiration. Embley investigated the matter in the Physiology School of Melbourne University, and published his findings in 1902. He showed that the main danger of chloroform was in its effect upon the heart.

While not all of Embley's work has survived 40 years of further research, it was a worthy contribution to anæsthesia, and stimulated world-wide interest, besides marking the beginnings of serious anæsthesia research in Australia.

A surviving contemporary of Dr. Embley, and perhaps the first Australian specialist in anæsthesia, is Dr. R. W. Hornabrook, who is still living in Melbourne, though long retired from practice.

He is known as a pioneer of 'open' methods of anæsthesia with ether and ethyl chloride. 'Closed' methods did not permit a free flow of oxygen, so bordered on being asphyxia rather than anæsthesia.

Dr. Hornabrook was followed by Dr. F. W. Green, also of Melbourne, who died in 1937. He played a major part in the introduction of endo-tracheal anæsthesia into Australia and was of great assistance to later specialists in that branch of medicine.

Until 1930, there were very few specialist anæsthetists in Australia, and this helped to retard Australian discoveries in anæsthetics. Previously Australia had been well behind in the application of latest overseas techniques.

Gas oxygen anæsthesia, for instance, had outgrown experimental stages in the United States by 1911, and in England by 1916, but it did not arrive in Australia till 1923.

But since 1930 the number of specialists has mounted steadily. To-day they are keeping abreast of latest overseas techniques, and new methods are practised within weeks of their publication abroad.

While American and British anæsthetists have been organized since the end of the last century, the Australian Society of Anæsthetists was created at a medical congress in Hobart (Tasmania) in 1934. A consciousness of their 'youth' has spurred Australian anæsthetists, and they are doubly anxious to make up for lost time.

Modern research into anæsthetics demands team work not only between doctors, but also pharmacologists, manufacturing chemists and engineers. The industrial gas and engineering industries of Australia have kept step with needs of modern anæsthesia. When the Australian army took to the field in 1939, it was equipped with anæsthesia gases and apparatus of Australian manufacture and design. To-day these industries are exporting the gases and the apparatus for their administration.

With the co-operation of Australian gas and engineering manufacturers and the various branches of science, Australian anæsthetists need no longer be able exponents of the ideas of others, but creators who will be able to follow the example set by Embley, and join other Australian scientists who have elevated Australia to world rank in scientific and industrial fields.

Public Health Section

A DIETETIC SURVEY OF GUJARATI MEDICAL STUDENTS

By J. D. PATHAK, B.Sc., M.D. (Bom.)

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To know if the diet of the students of the medical hostel, Ahmedabad, was adequate, a dietetic survey was undertaken for a period of 10 days in September 1946. There are three messes in the hostel, two strictly vegetarian and the third 'cosmopolitan' catering for mixed diet. The total number of members at the time of inquiry was 91 out of which 85 were Gujarati Hindus and six up-country Hindus. The latter were members of non-vegetarian club. There were 45 members in one vegetarian mess and 25 in the other. Most of the students were between 21 and 24 years of age.

They usually take a small breakfast and two principal meals at noon and in the evening, and a cup of tea in the afternoon. Wheat, maize, rice, pulses, vegetables and milk are the principal items of their diet. Their noon dishes consist of rice, dal, chapati, some pulse and vegetables. Occasionally they take 'farsan', i.e. fried articles as 'bhajis', etc. In the evening they usually take fried cakes or chapatis, vegetables and milk and sometimes rice and dal or 'khichari' in addition.

The items of food supplied for cooking were weighed every day for the 10 days of the inquiry. The cooked food left in the messes after the members had taken the meals was accounted for but the small amount left in their dishes after meals could not be determined and hence have not been deducted in the tables. In the process of cooking the water in which rice was boiled was partly discarded. Such a procedure is likely to result in some loss of vitamins especially B₁. The water in which vegetables were cooked was not thrown away. Fried articles were consumed often. The process of frying involves loss of fat lowering the caloric value besides rendering the articles less digestible. Due to the conditions existing at the time of inquiry fresh vegetables, meat and fish were difficult to get. In normal times, however, the vegetables are consumed in sufficiency.

The results of the survey are shown in tables I and II.

This is an estimate of 'gross food values'. In considering the 'net' figures therefore more than 10 per cent should be deducted. The food values have been taken from the tables prepared by Aykroyd (1941).

Discussion.—Gujarati diet is defective in many aspects. The boys in the hostel take a typical middle-class Gujarati diet. Their caloric intake is a little below than that required for their age and activity. The diet also lacks in 'protective' foods. It is very poor in animal proteins only 6.7 gm. per day. The fats, carbohydrates and iron are consumed sufficiently whereas calcium and vitamins A and C are taken inadequately.

They keep average good health but are poorly built compared to the European, Sikh or Pathan standards. Sore throat with occasional ulcers in the mouth and common cold are their most common complaints. None of the students showed signs of a manifest deficiency disease.

Very few dietetic surveys of Gujaratis have been made so far. Professor Kanga in 1934 had estimated the diet of Gujarat College Hostel Club for a week. The other systematic survey carried out on a fairly large scale in the Gujarati middle-class families in Bombay is by the Gujarat Research Society in 1941. Though its conclusions are based on an estimation of only one day's diet, it shows a similar inadequacy of Gujarati diet. These surveys do not mention whether the cooked food left after meals was accounted for or not. Their results are included in table II for comparison.

I thank the secretaries of the messes for helping me in collecting the above data and also Major P. C. Rakshit, I.M.S./A.J.R.O., Principal, B. J. Medical College, Ahmedabad, for kind permission to publish this article.

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TABLE I
Chief articles in grammes per head per day

Club	Wheat	Maize	Rice	Pulses	Vegetables	Milk, curds, etc.	Ghee and oils	Sugar and gur
I. Vegetarian	153	75	95	96	684	167	106	35
II. "	135	21.6	98	99	500	131	94	30
III. Mixed	138	110	39	98	400	227	64	38

TABLE II
Food values of diet consumed per head per day

Club	Proteins (gm.)	Fats (gm.)	Carbo- hydrates (gm.)	Calcium (gm.)	Iron (mg.)	VITAMINS			Calories
						A (I.U.)	B ₁ (I.U.)	C (mg.)	
I. Vegetarian	56.5 (6 animal)	114.9	415.4	0.72	36.1	1,246	675	30	2,986
II. "	60.7 (4.23 animal)	101.4	375.6	0.65	29.4	859	721	24	2,738
III. Mixed	63.5 (9.5 animal)	70.7	393.0	0.8	27.7	980	590	36	2,532
Average ..	60.2 (6.6 animal)	95.66	394.6	0.72	31.1	1,028	662	30	2,752
Consumption in Gujarati families as according to Gujarat Research Society (1941).	61.1 (6.96 animal)	82.63	385.6	0.741	34.8	1,508	555	49.5	2,550.7
Professor 'Kanga's' (1934) survey in Gujarat College Hostel.	58.30 (14.31 animal)	174.59	307.75			Not estimated			
Diet recommended for average adults (Aykroyd, 1941)	..	..	..	..	..	..	..	..	..
Diet recommended by Nutrition Research Council, U.S.A. (1945)—	..	..	..	..	..	..	..	..	..
For adult men	70	..	..	0.8	12	5,000	400	70	3,000
For boys 16-20	100	..	..	1.4	15	6,000	600	100	3,800

INCRUSTATIONS IN WATER PIPES AS AFFECTED BY FILAMENTOUS IRON BACTERIA

By S. C. PILLAI
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and

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INCRUSTATIONS and other biological growths in water mains and distribution pipes cause considerable difficulties in water engineering. The control of such obstructions in the pipes, in most cases, largely depends upon the character and composition of the water and the nature of the pipe material. A few years ago some studies were carried out at Bangalore on the tubercular incrustations in water pipes and the importance of the newly discovered species of *Pseudomonas* occurring in the ferruginous tubercles was indicated (Pillai, 1935, 1938). The observations on this bacillus also lent some support to the view expressed by Ellis (1919) in his monograph on 'iron bacteria' that in considering the affinities of the iron bacteria 'we must not expect to find a group of closely connected bacteria, and it seems very likely that in a few years we shall have representatives of iron bacteria from every one of the known classes of bacteria'.

In regard to filamentous iron bacteria in relation to potable waters, a considerable volume of literature has indeed accumulated, but the available information on the occurrence and distribution of these organisms in Indian waters is comparatively meagre. Nevertheless, some valuable observations have been made at certain waterworks in India, e.g. Madras and Negapatnam.

More recently, the present authors have made some observations on the influence of a species of filamentous iron bacteria on the incrustations in water pipes under certain conditions, and the object of this note is to give a brief account of these observations which mainly relate to the water distribution system at the Mysore Spun Silk Mills, Ltd., Chamnapatna. The water for this works (the daily consumption of water is about 100,000 gallons) is from a bore-well situated practically on the bank of a river which is for the best part of the year dry. The well is about 18 feet deep from the ground level. The water is first pumped into a series of settlement tanks from which it is conducted to the mills over a distance of about half a mile by means of underground cast iron pipes (4 inches diameter).

In the settlement tanks may usually be seen a considerable amount of a reddish-brown material forming small masses of a flocculent character and floating on the water. Examination of this material revealed that it is largely

due to the vigorous growth and activity of a species of filamentous iron bacteria (*Leptothrix oehracea*?), and the material is composed mainly of the cells of this iron bacterium, the ferruginous covering of the bacterial cells and the associated siliceous and other matter. The material when found in comparatively bigger masses and attached to the sides of the settlement tanks, also contained other forms of matter, including the eggs of larvæ of insect fauna such as the 'blood worms'.

The above ferruginous flocculent masses, when freshly formed, present the characteristic colour of the freshly precipitated ferric hydroxide, but if they are allowed to stand without further addition of water or if taken out and kept, they become dark brown or blackish due to decomposition of the associated organic matter. Under the conditions obtaining in the reservoirs and the distribution system into which fresh quantities of water are daily pumped, the iron bacterial masses maintain their colour and character. In the pipes these bacteria attach themselves to the sides and grow and cause gradual deposition of ferruginous matter and thus give rise to incrustations of considerable thickness. With a view to studying the nature and extent of the formation of such deposit in the pipes, the 'tail piece' pipe at the delivery side of the pump in the Pump House at Channapatna was thoroughly cleaned and put back, and the development of incrustations in this pipe was closely watched. In the course of a month the pipe showed inside a more or less uniform coating of ferruginous material of the above-mentioned type to the extent of about $\frac{1}{4}$ -inch thickness all over the surface. The deposit thus formed could easily be removed by hand; when it was allowed to dry and then water was pumped through the pipe, the ferruginous deposit was washed out as 'red water'. Examination of the pipe did not reveal any appreciable corrosion of the pipe material, and it appeared that the incrustation formed had derived its material largely from the water.

A number of samples of the incrustations developed in the pipe system were collected and examined, and the results of analysis of a representative sample of the material are given in table I. It was of some interest to observe that the incrustations taken out from the pipe at the farthest point in the distribution system (at the dead end of the system) were blackish presumably due to stagnation of water there and consequent decomposition of the organic matter in the incrustations.

The bore-well water contains considerable amount of iron (table II) and it would appear that the water is derived from a bed rich in iron. Geological survey has also generally shown that the granite in that area is rich in hæmatite.

With a view to finding out a suitable method of removing or reducing the amount of iron in

TABLE I
Chemical composition of the incrustations in the pipes

Composition	Percentage on moisture-free basis
Loss on ignition (organic matter) ..	6.16
Residue on ignition (mineral matter) ..	93.84
Silica and acid insoluble matter (mostly silica, SiO_2) ..	69.31
Iron (Fe_2O_3)*	15.69
Iron, aluminium, etc. (Fe_2O_3 , Al_2O_3 , etc.)†	23.97
Calcium (Ca)	0.75
Magnesium (Mg)	0.36
Sulphate (SO_4)	1.09

* Determined by the potassium dichromate method, using potassium ferricyanide as the external indicator. The ferric iron was reduced to the ferrous state by means of stannous chloride. The excess of stannous chloride was removed by the addition of a saturated solution of mercuric chloride prior to titration against $\text{K}_2\text{Cr}_2\text{O}_7$.

† Qualitative tests for aluminium, chromium and manganese were carried out. Aluminium and manganese were found to be present; chromium was absent. Manganese and aluminium apparently account for the remaining 8.28 per cent under the iron group.

TABLE II
Results of analysis of the bore-well water

pH value	7.6
	Parts per 100,000
Total solids	26.00
Loss on ignition (organic matter) ..	6.20
Residue on ignition (mineral matter) ..	19.80
Silica (SiO_2)	1.95
Iron (Fe_2O_3 , including Al_2O_3 *) ..	3.87
Calcium (Ca)	2.37
Magnesium (Mg)	1.18
Chloride (Cl)	2.44
Sulphate (SO_4)	7.92
Nitrite (N)	Nil
Nitrate (N)	Nil

* Al_2O_3 relatively inconsiderable amount.

the water to a minimum and thus controlling the development of the iron bacteria and the ferruginous incrustations in pipes, a number of experiments were carried out by filtering the water through different types of filters (such as

the sand filter, 'leaf filter' and the hand filter press) and inoculating the iron bacteria at different levels of iron in the filtered samples of water. When the water was filtered through sand (which was found to be the best of the filters tried) about 45 per cent of the iron originally present in the water was removed. By this process of sand filtration about 43 per cent of the silica was also removed, and it may be noted from table I that silica forms a very considerable constituent of the ferruginous incrustations. Filtration through the 'leaf filter' resulted in the reduction of about 41 per cent of the iron and about 28 per cent of the silica. The other types of filters examined were not found so satisfactory.

The filtered water samples were then inoculated with the special form of filamentous iron bacteria (just a loopful of the inoculum for about 2½ litres of the water). In all the cases the bacterial growth was actively promoted and the characteristic flocculent ferruginous material was formed in about 24 hours. After this period there was no further perceptible increase in the bacterial mass. In the control series, i.e. in the different water samples which did not receive the bacterial inocula, the characteristic ferruginous material was not formed to any appreciable extent. In the case of the sand filtered water, after treatment with the iron bacteria, a further reduction of about 37 per cent of the iron and about 12 per cent of the silica in the water was observed; the corresponding figures for iron and silica in the case of the 'leaf filtered' water are 33 and 8 respectively.

Further experiments were carried out by adding ferrous ammonium sulphate to distilled water (to the extent of about 10 parts of iron per 100,000 parts of the water) and inoculating the iron bacteria into these solutions (in conical flasks of 2 litres capacity). The effect of blowing air into these solutions was also studied; the aeration was carried out by means of the ordinary suction pump attached to a water tap. These preliminary experiments showed that over 90 per cent of the iron added to the water was removed from the solution at the end of about 6 hours, both under the conditions of artificial aeration of the medium and otherwise. The forced aeration had no appreciable effect. The investigation is under way.

The above observations are of considerable importance in regard to iron-bearing waters and their treatment for various uses.

The authors take this opportunity of thanking the authorities of the Mysore Spun Silk Mills, Ltd., Channapatna, for the facilities afforded in the course of the investigation.

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Current Topics

The Treatment of General Paralysis of the Insane (Dementia Paralytica)

By W. LEES TEMPLETON

(Abstracted from the *Medical Press*, Vol. 216, 3rd July, 1946, p. 11)

(1) In the treatment of general paralysis of the insane (dementia paralytica) induction of pyrexia by malaria is the method of choice. A recent review in *B.M.J.*, 18th May, 1946, suggests from figures derived from U.S.A. that artificial fever is much more successful than malaria in securing remissions in severe cases, but a perusal of the original paper shows the number of cases treated was only 37, surely too small a series to warrant any final claim of this sort.

(2) This may be repeated with benefit.

(3) The use of antisyphilitic remedies, particularly of the salvarsan series, in addition to malaria, leads to better recovery rates.

(4) Even acute and advanced cases can make good recoveries.

(5) Mental recovery depends upon the stage of the disease at which treatment is given.

(6) An 'allover' recovery rate of 50 per cent may be expected from malaria combined with drug treatment.

(7) Prophylaxis consists in subjecting to malarial pyrexia all cases of syphilitic infection who are resistant to ordinary antisyphilitic treatment, as judged by the serological findings in blood and c.s.f.

(8) As the action of malarial pyrexia is, it would seem, to kill the spirochæte wherever it may be, it is suggested that all cases of syphilis should have at least one course of such treatment. Only by this means does it seem likely that general paralysis of the insane will be wiped out entirely.

A Study of the Course of the Disease in Leprosy

By DHARMENDRA

and

I. SANTRA

(Abstracted from *Leprosy in India*, Vol. 18, April 1946, p. 43)

The subsequent course of the disease has been studied in 336 cases of leprosy detected in 1936-37, in a rural area in Bengal. Two hundred and forty-eight of these cases are still living in the area, while 88 died or left after having been under observation for five years or over.

Amongst the 268 neural cases, there was definite improvement or complete subsidence in over 40 per cent of the cases; in 30 per cent, the disease remained stationary; and in only 26 per cent, it became worse, including the change to the lepromatous type in only 2.5 per cent of the cases.

Amongst the 68 lepromatous cases, clinical improvement was seen in about one-third, although they did not become bacteriologically negative. In the remaining cases the disease either remained stationary or became worse.

Only about a quarter of the cases have taken treatment. In the neural cases, the improvement seen does not appear to be related to treatment; in many cases there has been improvement without any treatment, while in others, the disease has progressed in spite of the treatment. In the lepromatous cases, however, improvement has been seen more frequently in the treated than in the untreated cases.



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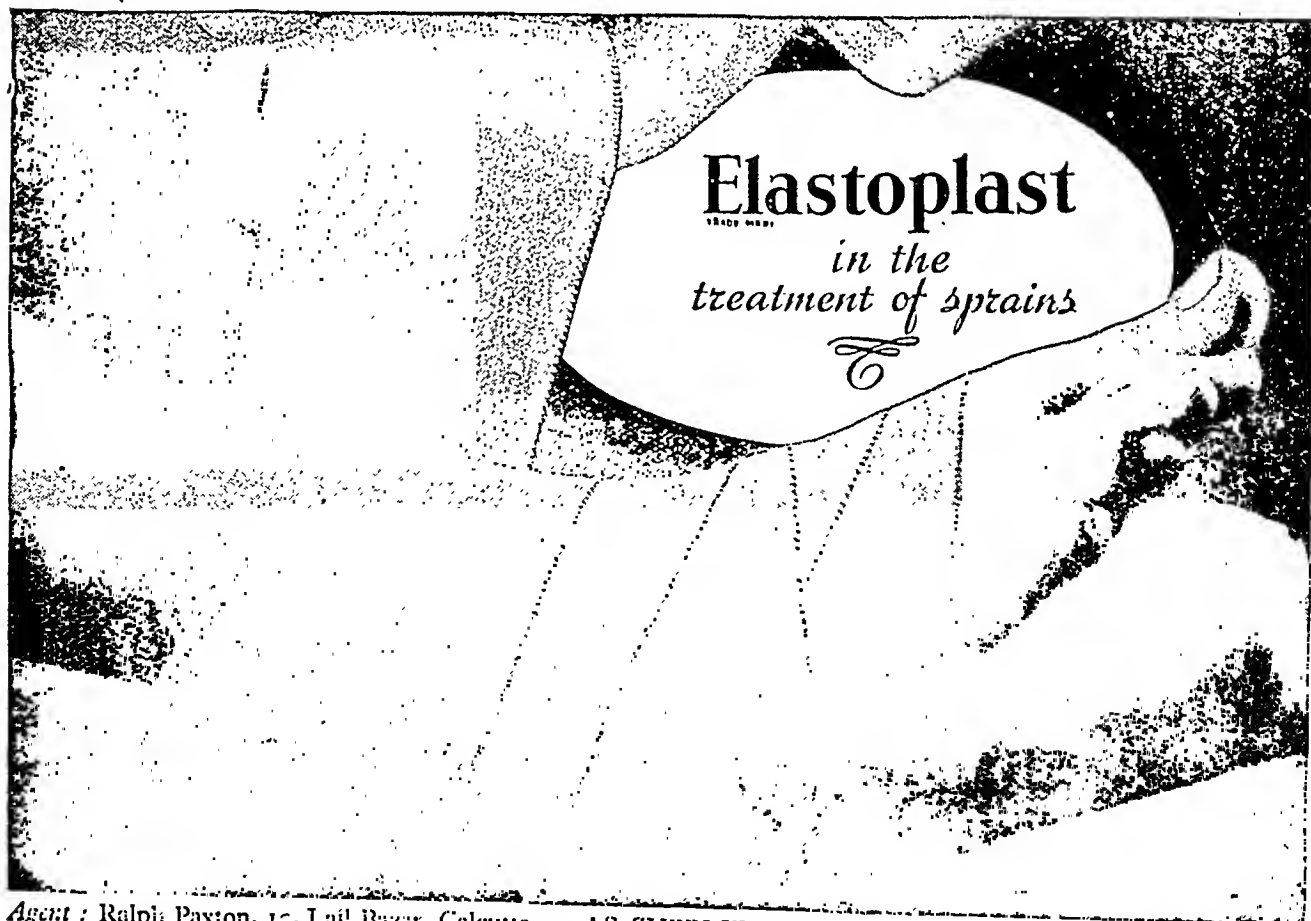
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The study confirms the prognostic value of the lepromin test.

In the lepromatous type, a few cases had a weak positive reaction, and improvement has been seen more frequently in these cases than in the larger group of lepromin-negative lepromatous cases.

In the neural cases, improvement and subsidence was more frequent in the larger lepromin-positive group than in the smaller lepromin-negative group. Moreover, the change from the neural to the lepromatous type was confined to the lepromin-negative group.

Amongst the neural cases, definite improvement and complete subsidence was much more frequent amongst the group having only patches, than in the group having sensory changes in the extremities, with or without patches.

The average duration of the disease in the neural cases under observation has been 18 years, the shortest period being 9 and the longest 56 years.

The average duration in the lepromatous cases has been 19 years, the shortest being 9 and the longest 36 years.

The average age at death of the neural cases has been 42, and the average duration of the disease at death has been 20 years. In the lepromatous cases, the average age at death and the average duration of the disease at death have been slightly lower, being 38 and 17 years respectively.

The change in type from the neural to the lepromatous has been seen only in about 2.5 per cent cases. The lesions of the neural type most likely to change later into the lepromatous type are the small rather ill-defined flat patches with little or no definite sensory changes, and with a negative lepromin reaction.

Spirochaetal Jaundice (Weil's Disease) Does it Occur in South Africa?

By G. BUCHANAN

(Abstracted from the *South African Medical Journal*, Vol. 20, 14th September, 1946, p. 507)

No evidence of spirochaetal jaundice was demonstrated in over 200 jaundiced patients investigated.

No rats and other rodents examined were found to harbour the causal spirochaete.

The leptospiræ present in local slimy waters produced no ill effects in guinea-pigs.

Survival of Penicillin-Sensitive Organisms in Dried Penicillin

By H. PROOM

(Abstracted from the *Lancet*, ii, 6th July, 1946, p. 11)

DRIED pathogenic penicillin-sensitive organisms may remain viable for a considerable period—at least 10 weeks—in contact with commercial dried penicillin. This mixture when dissolved and injected into animals may cause infection.

In practice the risk of infection from contaminated dried penicillin is small, but it is sufficient to make it advisable to test the sterility of dried penicillin before use.

Changes in the Concentrations of Carotene and of Vitamin A in the Blood of Sheep Grazing on Natural Pastures in South Australia

By A. W. PEIRCE

(Abstracted from the *Australian Journal of Experimental Biology and Medical Science*, Vol. 24, September 1946, p. 231)

In Merino sheep which grazed on natural pasture the concentration of vitamin A in the blood was found to lie between 25 γ and 35 γ per 100 ml. plasma. The concentration was not affected by changes in the intake

of carotene from 1 mg., while grazing on dry pasture in the autumn, to 2 gm. per day while grazing on green pasture in the spring. There was, however, a slight but significant increase in the concentration of vitamin A in the blood with age. Carotene was present in the blood in measurable amounts only when the sheep were grazing on green pasture. The amounts at such times, however, were only 5 to 15 per 100 ml. plasma, or 10 to 20 per cent of the total vitamin A potency of the blood.

In an area where perennial bush (*Kochia scdifolia*) formed the major constituent of the diet, the concentration of vitamin A in the blood was found to lie within the normal limits except at the end of a period of two years in which the rainfall was below normal. At this time the concentration had fallen to about two-thirds of the normal value.

In all the sheep which were examined the reserves of vitamin A in the liver were adequate; they ranged from 230 γ to 810 γ per gm. liver. Carotene was present to the extent of only 2 γ to 5 γ per gm. liver.

Benadryl

(From the *New Orleans Medical and Surgical Journal*, Vol. 98, May 1946, p. 511)

AND now another new drug, this time one to be used in the symptomatic relief of urticaria, hay fever and vasomotor rhinitis.

Benadryl, a new anti-histamine substance, promises to relieve the oedema produced by the histamine or histamine-like substances in these conditions. It decreases the cutaneous vasodilatation and has an antispasmodic effect on smooth muscle. Chemically the drug is beta dimethylaminoethyl benzhydryl ether hydrochloride.

In a recent symposium by members of the Mayo Clinic Staff, the results in the treatment of urticaria, hay fever and asthma, vasomotor rhinitis and serum reactions are enumerated and discussed. The authors found that the symptoms of urticaria were relieved in most cases, often as soon as one hour after the first dose, and in a few cases the attack of urticaria was terminated. Relief was also obtained in patients with angioneurotic oedema. The dosage varied from 50 to 100 mg. daily by mouth.

In hay fever patients almost complete relief was often obtained after two or three doses of 50 mg. of benadryl by mouth daily. After the first dose symptoms were relieved within one hour and the effect lasted from five to eight hours. In asthma, the drug was less effective, only a few patients getting partial relief.

In children the symptoms of these disturbances and serum reactions were relieved. Approximately 2 mg. of benadryl daily per pound of body-weight seemed to be adequate.

The drug may be given intravenously, intramuscularly or orally. It is moderately irritating when given intramuscularly. Side effects are greater with oral than parenteral administration and include drowsiness, dizziness, dry mouth and nervousness. All are transient and mild. Nausea and vomiting may require discontinuance of therapy. Since the drug decreases gastric acidity in some cases, it may offer a new approach to the control of gastric acidity. Drowsiness, not undesirable at bedtime, may be combated during the day with caffeine or benzedrine, and nervousness is not marked if the daily dosage is kept small.

The new drug, now available, opens vistas of relief for those sufferers of these annoying conditions.

Evaluation of Anthallan Treatment of Neurodermatitis Disseminata and Urticaria

By L. SCHWARZSCHILD

(Abstracted from the *New York State Journal of Medicine*, Vol. 46, 15th July, 1946, p. 1563)

THE therapeutic usefulness and safety of anthallan was studied in 35 cases of neurodermatitis disseminata,

41 cases of urticaria, and 8 cases of papular urticaria. None of these cases had shown any improvement in preliminary periods of observation under our supervision, nor under therapy which included many types of the usual specific or non-specific, local or systemic measures, or in subsequent periods when placebos were given. A significant beneficial influence was observed in about 80 per cent of the 84 cases treated with anthallan, this improvement varying between 50 and 100 per cent as evaluated by an objective scale herein outlined. Thirty-one of 35 cases of neurodermatitis disseminata, 36 of 41 chronic urticaria cases and all 8 cases of papular urticaria obtained an objectively recorded and verified benefit from anthallan such as they had not obtained from any other treatment given before.

In a large majority of the patients the beneficial therapeutic result observed at the end of anthallan treatment persisted. Partial relapses were few and only 2 cases evidenced complete relapse. These responded well to a second course of anthallan therapy.

Except for one case of transient and promptly reversible diarrhoea, clinical examination and laboratory studies of various kinds revealed no indications of toxicity produced by treatment with anthallan.

The mechanism by which anthallan exerts its activity is still obscure, nor are the entire scope and limitations of its usefulness clear. However, it is apparent from the results of this study that with the dose averaging 8 capsules daily for seven to seventy days, anthallan is a valuable and safe therapeutic agent for the treatment of those cases of neurodermatitis disseminata and chronic urticaria, which are not amenable to other forms of therapy.

Asthma and Urticaria following a Bee Sting

By H. REED

(From the *East African Medical Journal*, Vol. 23,
August 1946, p. 245)

THE patient, a European, aged 31 years, in whose house I happened to be staying, was going out of the back door at about 6-30 one evening when he was stung on the left ear by a bee. He thinks it was larger than the ordinary honey bee but was unable to see exactly what type it was as he hastily brushed it off and it flew haltingly away. The pain was so severe that he rubbed the ear between finger and thumb and in doing so dislodged the sting which had been left behind.

Within two or three minutes his face became flushed, his head began to throb and he felt so weak that he was glad to flop into an easy chair. Quite suddenly the nasal mucosa swelled so that he was compelled to breathe through his mouth, just as if someone had abruptly grasped his nose. A minute or so later he began to wheeze and had to breathe deeper and more forcefully. An attack of asthma immediately developed.

Half c.c. of adrenaline quickly gave relief, and he was able to cough up a little mucus and blow some out of his nose, but the respite was short-lived. Very soon unpleasant pink blotches began to make their appearance on the skin of his arms and within a few minutes his whole body was decorated with urticarial wheals.

Ten minims of adrenaline were then injected at rate of one minim per minute and this treatment caused a marked improvement in his breathing and in the state of the rash but he felt so shaky and chilly that he decided to go to bed, two ¼-grain tablets of ephedrine being given to prevent a return of the symptoms. The foregoing events all took place within the space of about 30 minutes but despite the ephedrine the symptoms began to return slowly.

At about 8 p.m., he was given a further injection of adrenaline 5 minims and two more ¼ grain tablets of ephedrine. At 9-30 p.m., however, yet another injection of 5 minims of adrenaline was required.

Luminal 3 grains were then given and the patient soon went to sleep and slept until early morning.

It was interesting to note that whilst the adrenaline and ephedrine controlled the asthma and urticarial wheals they appeared to have no effect upon an erythema which appeared all over the body. It was especially marked in the flexures and closely resembled a scarlatinal rash.

The next morning the patient felt very weak and vomited his morning tea as soon as he drank it. The nausea and vomiting persisted during the morning and since the patient had been having frequent attacks of malaria, a blood slide was taken and on microscopic examination, a few subtertian malaria parasites were seen. A quinine injection 9 grains was given at once and repeated in the evening.

The erythematous rash and the accompanying irritation gradually faded during the following 48 hours but the malaria did not clear up for several days.

The patient had been stung a few times by bees in England and in March 1944, 20 months previously, whilst on safari in Lake Province, he had been stung on the scalp by four or five bees but on no occasion was there any reaction beyond the local pain and swelling and some slight enlargement and tenderness of the regional lymph glands. He himself had never before shown any hypersensitivity reaction. The patient's father, however, as a young man suffered from urticaria which was caused by eating potatoes. Later on he developed 'hay fever' and finally asthma. His father's brother had occasional slight attacks of asthma and his sister had 'hay fever'.

An Epidemic of a Severe Pneumonitis in the Bayou Region of Louisiana

By G. L. FITE *et al.*

(Abstracted from *Public Health Reports*, Vol. 61,
26th July, 1946, p. 1100)

RELATION OF THE LESIONS PRODUCED IN ANIMALS BY LOUISIANA PNEUMONITIS VIRUS AND THE RICKETTSIAE

THE many studies of the rickettsial diseases, especially typhus and Rocky Mountain spotted fever, in laboratory animals, Mooser, Hach, and Lillie and Dyer have shown that in these diseases the viscera of infected guinea-pigs are not involved to the same degree as are the viscera of guinea-pigs infected with Louisiana pneumonitis virus or the viruses of psittacosis and meningopneumonitis. Occasional foci are found in the brains of certain guinea-pigs inoculated intraperitoneally with Louisiana pneumonitis virus and these bear a close similarity, or even identity, to those seen in guinea-pigs similarly infected with typhus or spotted fever virus. Although the lesions are less extensive and less well developed, their relation to blood vessels appears to be the same as that of the lesions noted in the rickettsial diseases. The foci in the testes of guinea-pigs infected with Louisiana pneumonitis virus are also similar to lesions seen in the testes and scrotum of guinea-pigs infected with rickettsiae of typhus fever. The presence of infiltrating mononuclear cells is reminiscent of typhus fever infections. The tendency of Louisiana pneumonitis virus and the viruses of psittacosis and meningopneumonitis to produce fibrin thrombi in capillaries is far greater than that of typhus fever rickettsiae.

SUMMARY AND CONCLUSIONS

The virus of Louisiana pneumonitis produces extensive lesions in mice, guinea-pigs, and cotton rats, following intraperitoneal inoculation. In albino rats and hamsters, lesions are produced by large doses of the infecting agent but the virus is infrequently lethal for these animals. Rice rats, muskrats, ferrets, deer mice, nutria, and rhesus monkeys are not susceptible to infection with this virus. The variation in the quality of the lesions produced in mice, guinea-pigs, and cotton rats by the Louisiana pneumonitis virus

must be considered one of its distinctive features. In mice infected intraperitoneally or intracerebrally the lesions produced are probably indistinguishable from those caused by the viruses of psittacosis and meningopneumonitis. In mice infected intranasally with Louisiana pneumonitis virus the resulting pneumonic process shows material differences from the lesions in mice similarly inoculated with the other agents. There is no bronchial involvement and no tendency toward interstitial spread of infection in the lungs of mice infected with the agent under study.

The infection in guinea-pigs is characterized by extensive fibrinous thrombosis of capillaries and sinuses of the liver and spleen, with comparatively less cellular reaction than observed in the mouse.

An extensive plastic fibrinous peritonitis constitutes the chief alteration in cotton rats. Comparatively trivial changes occur in the organs.

Animals intracerebrally inoculated show a dry meningitis with slight extension of the process into the superficial brain tissues along the blood vessels. Mice and guinea-pigs infected intraperitoneally occasionally may show lesions in the brain similar to those occurring in guinea-pigs infected with the rickettsia of typhus fever or spotted fever.

Experience with BCG Vaccine in the Control of Tuberculosis among North American Indians

By J. D. ARONSON

and

C. E. PALMER

(Abstracted from *Public Health Reports*, Vol. 61, 7th June, 1946, p. 802)

THE present paper gives the results of a study, begun in December 1935, on the effect of BCG vaccination on the incidence of tuberculosis among American Indians. The study group consisted of 3,007 persons, ages 1 to 20 years, who were selected from a larger group on the basis of a negative tuberculin reaction. BCG vaccine was given intracutaneously to 1,550 with 1,457 serving as controls. These persons were followed for 6 years with annual tuberculin tests and chest x-ray examinations.

Tests of the vaccinated and control groups as to age, amount of exposure to tuberculosis, and completeness of follow-up indicate that the two groups are comparable in these respects.

Results from the analysis of the records show that BCG vaccination is associated with marked protection against the development of tuberculosis as measured by mortality and morbidity experience of the two groups.

During the 6-year period, 60 deaths from all causes occurred among the 1,457 persons in the control group compared with 34 among 1,550 vaccinated. In terms of deaths per 1,000 person-years, the death rates were 7.2 and 3.8, respectively. There were 28 deaths assigned to tuberculosis among the controls as compared with only 4 such deaths among the BCG group.

Comparison of cases, as determined mainly from radiological evidence, supplemented by data from tuberculin tests, revealed similar wide differences between the two groups. Including those that died from tuberculosis, 48 cases were classified as having extrapulmonary tuberculosis or advanced pulmonary lesions among the controls while only 9 such cases were found among the vaccinated. There were 20 cases showing x-ray evidence of minimal lesions among the controls and 8 among the vaccinated. The corresponding figures for cases showing enlarged hilar glands were 99 and 19, respectively, and for pleural effusion 18 and 4, respectively.

The comparison for total incidence, cases of all types and deaths, is that of 185 among the controls and

40 in the vaccinated. In terms of cases per 1,000 person-years, the rates were 24.3 and 4.7, respectively.

There is no evidence from the analysis that a diminution of immunity occurred with the passage of time after vaccination. On the contrary, indications were that the protection may be greater in the later than in the earlier years after vaccination.

The total incidence of cases among the controls was nearly constant for all age groups, while among the vaccinated there was a marked decrease in incidence with advancing age. The evidence is suggestive, although not conclusive, that BCG vaccination may be more effective in the older than the younger children.

Some variation in the effectiveness of the different lots of vaccine was noted. Lots 8, 9, and 10 appeared to afford much less protection than the others used.

A Dressing for Burns and Extensive Abrasions

By G. S. KING

(From the *New York State Journal of Medicine*, Vol. 46, 15th July, 1946, p. 1567)

THROUGHOUT the past two decades the treatment of extensive burns and abrasions has undergone most decided changes. First, in the recognition that the injury, *per se*, is not so much the causative factor in the patient's condition, after initial shock, as the accompanying local and general sepsis which occurs after the injury.

Immediate treatment of the initial injury to combat subsequent sepsis and, perhaps more important the immediate initiation of medical treatment to combat systemic poisoning is now the accepted procedure. The administration of plasma, blood transfusions, intravenous feedings with glucose or amigen solution, the sulpha drugs, penicillin, all pay their life-saving rôles. Local application of remedial substances, ointments, solutions, the compresses, etc., has been the standard procedure for centuries, the only difference being the type of drug or solution used and, as knowledge of the technique of preventing and combating surface infection has grown, these medications have been changed to conform to that knowledge, although many of the older and time-proved remedies are still in ethical and beneficial use.

The method of application of these local medications is the main factor in the treatment of burns or abrasions that has not been very radically changed or modernized. Medications are still applied to the denuded surfaces of burns or abrasions on gauze. Occasionally, paraffined mesh is used but gauze is the general medium of application.

No matter how thoroughly gauze is soaked in aqueous, oily or greasy media, it has a certain amount of capillary attraction and has a tendency to adhere and actually grow fast to a denuded area. Changing dressings, especially removal of a soiled dressing, is usually the most painful part of the treatment of a severe burn or abrasion.

A new form of dressing for burns and abrasions, especially those of the extensive variety, in the form of a perforated film of very thin cellophane has been described. The E. I. du Pont de Nemours Company of Wilmington, Delaware, manufactures a thin cellophane film, perforated with 1/32-inch holes on a 3/32-inch centre, which is ideal for the type of surgical dressing suggested. This cellophane film may be sterilized in an autoclave or by immersing in alcohol and drying. As a surgical dressing it is ideal if used in the following manner:

To the upper surface of a strip of perforated cellophane apply a generous coating of medication—sulpha, penicillin, or any ointment of choice. Apply the medicated film face down; that is, the perforated cellophane surface directly on the denuded area, the ointment being on top of the film. Cover the medicated side with a strip of non-perforated cellophane film, thus forming a sealed container of ointment over the wound. Using a series of perforated medicated film strips, covered with non-perforated film strips, the

wound is completely covered with an air-tight, germ-proof housing over any desired area.

Simple bandages hold the dressing in place. If desired, compression bandages may be applied. Any excess of the medication as it melts and seeps over the wounded surface, exudate from the wound, or serum, gravitates downwards to absorbent material placed at the lowest margin of the wound, or beneath the injured member. This excess exudate, when collected on the absorbent material, may be readily changed without disturbing the original dressing. This form of dressing allows frequent dressing of the wound. It is absolutely non-adherent and may be removed without pain or discomfort to the patient. This form of dressing requires less frequent changes than gauze dressing. It is less expensive as it requires very much less medication than the same medication applied on gauze. The cellophane film is inexpensive. This dressing can be applied in much less time than gauze dressing and it is almost ideal for skin graft. Being transparent, the wound may be inspected without removal of the dressing.

At present, the perforated cellophane film as well as the pliable non-perforated film are not readily obtainable, but should soon be marketed by surgical houses, if there is any demand for such film by the medical and surgical profession. In a previous article, the use of envelopes of cellophane with the bottom side perforated was suggested. Since the publication of the aforementioned articles, the perforated film was found and this newer and simpler form of application is recommended.

Angina Pectoris

(Abstracted from the *Medical Journal of Australia*, Vol. 1, 4th May, 1946, p. 632)

PICKERING AND SANDERSON, in returning to the old subject of tobacco and its bearing on the production of angina, are not convinced by many of the case records in the literature. Though it is generally believed that tobacco can cause disturbances of rhythm and can be responsible for attacks of pain, they feel that the pattern of anginal attacks described as occurring in relation to smoking often does not resemble the true angina of effort.

Nevertheless, the real point is that to prevent anginal attacks the heart rate must be kept down, and even if tobacco seems insecurely established as a contributory cause, reasonable clinical evidence is warrant for its curtailment. It might be interesting to raise the question of the possibility of tobacco enhancing the response of the cardiac nerve endings to the hypothetical pain substance but this would be difficult to answer. Efforts of various kinds have been made to interrupt the neural path of pain. Occasional success has rewarded the surgical division of the path in the upper sympathetic chain, and more recently an attempt has been made to arrest pain at the thalamic level.

A. S. Freedberg and J. E. F. Riseman record some success from the use of cobra venom. This powerful substance has been found to act as a sedative on the central thalamic mechanism and has been used to relieve the pain of inoperable cancer.

They now present a study of twelve patients who have been treated in this way.

Cobra venom was injected into the deltoid muscle in doses of ten to twenty mouse units, in a volume of one to two millilitres, daily for three to seven days till a therapeutic effect was obtained. An increase in exercise tolerance was obtained varying from 25 per cent to 75 per cent, the degree of improvement not running parallel to the previously observed response to vasodilators. Indeed several patients who had gained no relief from nitroglycerin were benefited by the venom. The electrocardiographic findings after exercise were not altered, even though pain was relieved. Results were only temporary in most cases, and a biweekly maintenance dose was necessary, though in one instance even this did not prevent a return of pain as before.

In *angina pectoris* there are three possible points of attack; to limit the causal exertion and thus to keep down the heart rate, to relieve coronary ischaemia, and to curb the nervous mechanism that registers pain.

This question has often been raised: If we succeed in preventing anginal pain, do we expose the patients to the risk of damaging his heart by rash overwork? Experience has so far returned a favourable reply—with discretion in the matter of exertion the heart is not in greater peril because its threshold of pain more nearly approaches the normal.

Penicillin Lozenges

By R. C. PARNABY

(From the *Pharmaceutical Journal*, Vol. 156, 8th June, 1946, p. 371)

PROFESSOR BERRY suggests that patients using penicillin lozenges should be instructed to suck, not to chew the lozenges. My advice has always been that they should be retained in the buccal cavity, for by so doing each lozenge of the compressed type persists for almost two hours. As the usual direction has been 'one lozenge two-hourly' it can be seen that the saliva is bacteriostatic almost continuously. A specimen of saliva taken after 30 minutes of retention of a lozenge in the buccal cavity definitely inhibited the growth of *Staphylococcus aureus*, Oxford strain. Thus a very real economy in the consumption of the lozenges can be effected without sacrificing their efficiency and it would be in the interest of the patient.

Reviews

AN INTRODUCTION TO BACTERIOLOGICAL CHEMISTRY.—By C. G. Anderson, Ph.D. (Birm.), Dip.Bact. (Lond.). Second Edition. 1946. E. and S. Livingstone Limited, Edinburgh. Pp. x plus 500. Price, 20s.

ON the biochemistry of micro-organisms this handy volume supplies, in a small compass, information which is spread out in many and larger books. The chapter on the isolation and identification of metabolic products though only an introduction to the subject is remarkably informative. Antibiotics, chemotherapy and immunology have been included as associated subjects.

Direct communication has been established with the election in therapeutics (p. 141). Antibodies have been given size and shape, and the peptide chains at their ends visualized (p. 422).

Possibly some details of formulae could be deleted without detriment to the bacteriologist. The space so created could be filled by more matter under Alcoholic fermentation and Industrial fermentation. Apparently useful details of preparing alcoholic beverages remain the secret of the industrialists.

Of the resistance said to be developed by bacteria to penicillin, because of small dosage (p. 176), now there is no evidence. Unlike what happens in the case of sulpha drugs, it can be overcome by a bigger dose.

On page 434, para 2, line 7, 'activation' should be 'inactivation'.

The paper, printing and binding are good. The price could have been a trifle lower and more in keeping with that of books of the same size on bacteriology and chemistry.

A very useful book for bacteriologists and immunologists. S. D. S. G.

THE HUMAN APPROACH: A BOOK FOR MEDICAL STUDENTS.—By Henry Yellowlees, O.B.E., M.D. (Glas.), F.R.F.P.S. (Glas.), F.R.C.P. (Edn.), F.R.C.P. (Lond.), D.P.M. (Lond.). 1946. J. and A. Churchill Limited, London. Pp. vii plus 189. Price, 10s. 6d.

THIS book includes amongst other useful hints on the contact between the patient and the physician a diplomatic approach to the jury in the matter of criminal responsibility on which medicine and law do

not see eye to eye. The psychiatrist, according to the author, should manage to convey to the jury what the judge is bound to disagree with, concessions which go beyond the McNaughten rules. The move usually succeeds. Even when it fails, the prisoner, after conviction, receives the benefit of another examination by psychiatrists.

The other hints are undoubtedly true and practical. But whether a student (for whom the book is stated to be written) will appreciate them is open to question by mature medical men with experience of teaching.

Psychological items which have entered parlance in medical circles during the last two decades (unconscious mind, projection, phantasy, herd, anxiety, inferiority, rehabilitation, etc., etc.) are explained concisely. At times Alice in Wonderland and a crack golfer combine forces to drive a point home.

With the 'utterly fallacious distinction between bodily and mental symptoms' and the inadvisability of telling a syphilophobic who is not suffering from syphilis that there is nothing the matter with him, one may not agree.

There is no index but the readability of this small book and a table of contents make up for this loss.

The paper, printing and binding are good. No printer's errors attract attention.

S. D. S. G.

MEDICAL ASPECTS OF GROWING OLD.—By A. T. Todd, M.B. (Edin.), M.R.C.P. (Lond.). 1946. John Wright and Sons Ltd., Bristol. Pp. 164 with 13 figures. Price, 15s.

In this unique book the author expresses his personal opinions on matters of comfort, health, life and death of maturing and mature people. There is no lack of confidence in the expression. Here are a few instances: (1) Blood pressure above the normal, after a certain age, need not worry anyone. It varies with the build as is shown by the thigh recording a higher reading than the arm. One agrees. (2) Allergy is not specific essentially. A hidden focus causes the primary trouble. Later, all sorts of antigens begin to react. One may agree. (3) Milk proteins, specially the lactalbumen, are poisonous unless denatured by churning. One may not agree: they may not agree with some subjects, but do agree with the majority. (4) Adapt your foot to the shoe. One does not agree. Even a little study in the classification of the foot (depending on the arch and relative length of the great and the next toe) enables one to choose the shape. When possible the shoes should be made to measure. When not possible they should be modified according to the measure. The makers will wrap canvas round a part of one foot of a pair of the last to make the smaller side bigger: one foot is always bigger than the other. Shoes have been made by this device, by firms of repute, at very little extra cost.

Chapters on exercise, genito-urinary troubles, and skin and hair are excellent, and do not lend themselves to controversy.

The book when not informative is provocative of thought. Is well worth reading.

The paper, printing and binding are excellent. A minor printing error occurs on page 143: in 3rd para, 1st line, after ':' there should be '(1)'.

S. D. S. G.

INTRODUCTION TO CLINICAL NEUROLOGY.—By Gordon Holmes, M.D., F.R.S. 1946. E. and S. Livingstone Limited, Edinburgh. Pp. vii plus 183. Illustrated. Price, 12s. 6d.; postage, 6d. (home)

The special feature of this little book is the lucid exposition of the correlation between neuro-physiology and clinical neurology.

While all essential details are presented in an easily assimilable logical sequence, those of the autonomous nervous system and of the disorders of speech are particularly arresting.

The practitioner will find the book pleasantly reminiscent and the student useful.

S. D. S. G.

CARDIOVASCULAR DISEASE IN GENERAL PRACTICE.—By Terence East, M.A., D.M. (Oxon.), F.R.C.P. (Lond.). Second Edition. 1946. H. K. Lewis and Company, Limited, London. Pp. x plus 188, with 40 illustrations. Price, 12s. 6d.

As most patients die ultimately from failure of the heart and most of them while so dying are under the treatment of general practitioners, it is meet and proper that the recent advances in cardiovascular diseases should be made plain to the general practitioner. This is done in this little book by a cardiologist. He does it thoroughly and without the aid of the electrocardiogram (excepting the merest mention of T on page 16).

Most elementary matter is included for here the most serious mistakes are likely to be made.

Among other elucidations the recognition by simple signs of the extra systole, heart block, palpitation, effort syndrome, imagined heart disease and heart attack is made easy.

The average medical man cannot fail to find the book both interesting and instructive.

The paper, printing and binding are excellent. No printer's errors attract attention.

S. D. S. G.

EYE SURGERY.—By H. B. Stallard, M.B.E., M.D. (Cantab.), F.R.C.S. (Eng.). 1946. John Wright and Sons Ltd., Bristol. Pp. xi plus 444, with 338 illustrations. Price, 50s.

ANYONE familiar with the author's work and publications will expect to find clarity of expression and minute attention to detail. They will not be disappointed in this book. As Sir John Parsons points out in a foreword, the author does not attempt to enumerate a large number of alternative methods of performing various operations but rather to record the methods adopted by an experienced surgeon. Thus with each operation recorded one obtains a wealth of information as to exact details of technique and surgical minutiae—information that is often lacking in those works which for the most part describe the techniques used by others. Particularly valuable are the chapters on The Eyelids and Reconstructive (Plastic) Surgery and Traumatic Surgery, civil and military. Here is recorded much of the author's experience as a Military Surgeon during the last war. While some surgeons may prefer their own technique for a particular operation in some cases, all will read the book with the greatest pleasure and profit. There are 338 illustrations many of which have been beautifully drawn by the author himself. The book should be read by all ophthalmic surgeons.

E. J. S.

SQUINT AND CONVERGENCE: A STUDY IN DIOPHTHALMOLOGY.—By N. A. Stutterheim, M.D. (Rand). 1946. H. K. Lewis and Company, Limited, London. Pp. vii plus 95, with 26 Graphs and 15 Diagrams. Price, 15s.

THE author states that many years ago he 'operated and corrected ametropias, as many others did, with of course the usual unsatisfactory results'. As the result of the little success that he obtained with the more orthodox types of operation, he started treating squint case by means of a battery of prisms of varying degrees—a method he terms di-ophtalmology. The treatment takes about one year of daily attendance to complete during which most patients must wear an occluder over one eye. The author suggests that during this year's treatment the patients 'should

preferably be taken out of their home surroundings, which often form a drawback to the treatment' and 'should be placed together in special hostels attended by school nurses'. In spite of this prism treatment, of the twenty-six cases described, twenty-one eventually required surgical intervention. The author does not appear to care for the word 'operation' and prefers to use the term 'surgical adjustment' for the procedure he uses. This consists of an operation for the adjustment of Tenon's capsule which is shortened by a technique originally described by Von Wecker in 1888. The book could be improved by a more lengthy and detailed description of the use of the battery of prisms and some pictures showing the stages in the operation. The book will be of interest to ophthalmologists.

E. J. S.

AMERICAN POCKET MEDICAL DICTIONARY.—

Edited by W. A. Newman Dorland, A.M., M.D. Eighteenth Edition. Published by W. B. Saunders Company, Philadelphia and London. Pp. 1081. Price—Plain edition 10s. With thumb index 12s. 6d.

MANY practitioners are no doubt familiar with this book which gives the pronunciations and concise definition of medical terms arranged alphabetically and with many tables which are convenient for quick reference. First published 50 years ago, it has gone through eighteen editions, so it needs no introduction. In this edition the book includes many new terms that have appeared in the literature during the last four years, covering almost every branch of medicine. Few of us can turn over its pages without getting a little wiser.

R. N. C.

BOOKS RECEIVED

Nutrition. Bulletin No. 23, November 1946. Published by the Department of Food, Government of India, New Delhi. Pp. 31. Illustrated.

Any Questions

PFEIFFERELLA WHITMORI

SIR,—In the September 1946 issue of the *I.M.G.* on page 368, 2nd column, under the 'Tenth Clinical Meeting of the Calcutta School of Tropical Medicine', para (2) *Bacillus whitmori* is described as a Gram-negative organism.

In Napier's *Principles and Practice of Tropical Medicine*, 1943, on page 365, the same organism is described as Gram-positive.

Will you please tell us which of these statements is correct?

Also, perhaps you can tell us when part II of Napier's *Principles and Practice of Tropical Medicine* can be had. The recognized booksellers in India are not able to help.

Yours, etc.,

'ARUNDEL COTTAGE', B. J. BOUCHÉ, M.R.C.S., L.R.C.P.,
MUSSOORIE. MAJOR, I.M.D. (Retd.)

(On page 492 of 'Topley and Wilson's *Principles of Bacteriology and Immunity*', 3rd edition, revised by G. S. Wilson and A. A. Miles, 1946, the morphology of *Pfeifferella whitmori* is described as follows:—

'Small, slender rods, 1-2 μ long and 0.4-0.5 μ broad; sides parallel, ends rounded, axis straight; arranged singly, in pairs end-to-end, or sometimes in long parallel bundles, the bacilli being embedded in an interstitial substance. Variations occur in depth of staining; bipolar staining common, especially in films from infected tissues. Motile; Gram-negative; acid-fast granules have been described in freshly isolated strains (Finlayson, 1944). The short, oval, bipolar-stained rods are characteristic of the rough form; the longer, narrower rods, arranged in palisades with irregular staining and shadow forms, are characteristic of the smooth variant.'

Part II of Dr. Napier's '*Principles and Practice of Tropical Medicine*' is now in the final stages of printing and is expected to be out soon.—EDITOR, *I.M.G.*

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL E. G. MONTGOMERY is appointed Principal of the Medical College for Licentiates, Calcutta, and Superintendent of the attached Hospital with effect from the 28th October, 1946.

Major F. H. A. L. Davidson, Civil Surgeon, Dacca, is appointed to be Civil Surgeon, Darjeeling, vice Major J. Brebner.

The undermentioned officers of the I.M.S. (E.C.) revert from the I.A.M.C. and are seconded for service in the Royal Indian Air Force:—

Captain S. R. Kidiyoor. Dated 30th August, 1946.

Captain B. K. Basu. Dated 5th September, 1946.

Captain G. C. Sen Gupta. Dated 11th September, 1946.

The undermentioned officers of the I.M.S. (E.C.) are granted Emergency Commissions:—

ROYAL INDIAN AIR FORCE—MEDICAL BRANCH

To be War Substantive Flight-Lieutenants

Captain S. K. Muhury. Dated 21st August, 1946.

Captain B. K. Basu. Dated 5th September, 1946.

Captain K. S. Rao. Dated 6th September, 1946.

Captain G. C. Sen Gupta. Dated 11th September, 1946.

LEAVE

Lieutenant-Colonel J. C. Drummond, Civil Surgeon, Chittagong, is granted leave for 6 months, with effect from the 14th November, 1946.

Major J. Brebner, Civil Surgeon, Darjeeling, is granted leave for 8 months, with effect from the 28th December, 1946, or from the date of relief.

PROMOTIONS

Lieutenant-Colonel W. O. Walker, I.M.S. (retd.), on reversion to retirement, is granted the honorary rank of Colonel, 20th February, 1945.

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captains to be Majors

M. Alam. Dated 2nd July, 1946.

5th July, 1946

D. F. Vachha.

S. L. Bhandari.

Y. G. Joshi.

H. P. Mehta. Dated 15th July, 1946.

B. L. Roy Chowdhury.

Ramesh Chandra Biswas.

Pargat Singh.

N. S. Sankara Narayanan.

21st July, 1946

Partul Chand Lohtia. R. R. Lal.

5th August, 1946

E. A. Shellim. S. L. Kalra.
P. J. Engineer. Rai Sahib L. P. Misra.

6th August, 1946

M. Talukdar. G. S. Sidhu.
G. K. Ray. Dated 7th August, 1946.
M. Aslam. Dated 9th August, 1946.
G. Ahmad. Dated 10th August, 1946.
A. S. Gharjakhla. Dated 18th August, 1946.

19th August, 1946

M. P. Ali. K. R. Rajagopal.
M. H. Alvi. Dated 20th August, 1946.
S. K. Sen. Dated 24th August, 1946.

4th September, 1946

S. S. Sidhu. R. I. Krishnaswami.
S. Sandhu.
G. S. Vingla. Dated 6th September, 1946.
N. D. P. Kirohi. Dated 10th September, 1946.
A. Qadir. Dated 20th September, 1946.
M. A. Khan. Dated 25th September, 1946.
P. A. Menon. Dated 27th September, 1946.*Lieutenants to be Captains*P. I. Atkinson. Dated 19th February, 1946.
R. N. Dutta. Dated 28th February, 1946.
P. K. Basu Roy. Dated 12th March, 1946.
T. Fonseca. Dated 17th March, 1946.
M. S. Narayana Rao. Dated 13th April, 1946.
G. J. K. Peck. Dated 1st May, 1946.
M. Siddiqui. Dated 2nd May, 1946.
B. Shivshankar. Dated 3rd May, 1946.
P. G. Paul. Dated 4th May, 1946.
M. N. Nambiar. Dated 5th May, 1946.
A. V. Rao. Dated 5th May, 1946.
D. R. Rao. Dated 6th May, 1946.

14th May, 1946

G. A. Paulie. E. F. Harben.
C. B. J. Alexander. R. S. Bower.
K. S. George. Dated 18th May, 1946.
M. P. Mathur. Dated 23rd May, 1946.
A. Sen. Dated 24th May, 1946.

27th May, 1946

B. L. Agarwal. S. Banerjee.

28th May, 1946

A. C. Chopra. S. Y. Siddiqui.
D. S. Rastogi.
R. C. Ram. Dated 15th June, 1946.

17th June, 1946

P. S. R. Naidu. B. R. Buliga.
S. C. Pant. Dated 18th June, 1946.
I. C. Khanna. Dated 25th June, 1946.
S. K. Mazumdar. Dated 5th July, 1946.

7th July, 1946

Shams-ur-Rahman. A. Rashid.
K. Mustafa.

8th July, 1946

M. Anin. R. Singh.
K. Ahmad. P. N. Trikha.
L. D. Khurana. S. L. A. Bokhari.
Mujeeb-ur-Rahman.L. G. Pereira. Dated 20th July, 1946.
N. H. Antia. Dated 21st July, 1946.

22nd July, 1946

K. S. Ahluwalia. P. K. Garg.
K. M. Murad. G. S. Ahluwalia.
K. L. Chopra. S. B. Rajpal.
S. K. Kudva. Dated 25th July, 1946.

28th July, 1946

G. M. S. M. Soomro. K. J. Vyas.
B. K. Jerth. Dated 3rd August, 1946.
A. G. Gotting. Dated 10th August, 1946.

13th September, 1946

R. M. Guezelar. A. L. Sealey.
M. U. Hyat. J. F. Gow.
V. Ranganathan. P. K. Srinivasan.
S. Thirumali. D. J. Antony.
N. Gopinath. K. V. B. Menon.
T. Ramaswamy. K. M. Iyer.
N. K. Menon. B. B. Krishnachar.*Captain to be Major*

Mrs. G. E. Brindley. Dated 12th July, 1946.

INDIAN MEDICAL SERVICE

SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

(WOMEN'S BRANCH)

Lieutenant to be Captain

Miss N. K. Sumana. Dated 5th January, 1946.

RELINQUISHMENTS

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Colonel :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Colonel Mohammad Ziaullah. Dated 10th July, 1946.

The undermentioned officers are permitted to relinquish their commission on release from army service and are granted the honorary rank of Lieutenant-Colonel :—

Ty. Lieutenant-Colonel Velacheri Kuppuswamy Sundaram. Dated 14th October, 1946.

Ty. Lieutenant-Colonel R. A. Davar. Dated 8th November, 1946.

Ty. Lieutenant-Colonel Prasanta Kumar Chatterjee. Dated 8th November, 1946.

Ty. Lieutenant-Colonel V. R. Thayumanaswami. Dated 10th December, 1945.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Ty. Major R. Subramanian. Dated 13th March, 1946.

Ty. Major Ranjit Singh Garewal. Dated 19th August, 1946.

Ty. Major A. Krishnan. Dated 4th September, 1946.

Ty. Major G. S. Guha. Dated 13th September, 1946.

Ty. Major S. C. Driver. Dated 26th September, 1946.

Major Nazir Ahmad Barlas. Dated 30th September, 1946.

Major Billa Narayana Rao. Dated 30th September, 1946.

Major V. Hariharan. Dated 2nd October, 1946.

Major P. J. Engineer. Dated 6th October, 1946.

Ty. Major Thurnthel Chandu John. Dated 27th October, 1946.

Major H. N. Dastur. Dated 4th November, 1946.

Major J. L. G. Pinto. Dated 4th November, 1946.

Major P. F. D'Souza. Dated 15th November, 1946.

Ty. Major Anil Kumar Das. Dated 25th November, 1946.

(WOMEN'S BRANCH)

Ty. Major (Mrs.) C. L. Mary Drummond (née Newman). Dated 5th November, 1946.

Captain P. S. Bhargava, Assistant to Medical Adviser (Pensions), Defence Department (Pensions Branch),

relinquished the appointment, 23rd November, 1946 (afternoon).

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

- Captain N. P. Devadason. Dated 29th April, 1946.
 Captain C. F. Paice. Dated 1st May, 1946.
 Captain Fakir Chandra Mukerjee. Dated 13th May, 1946.
 Captain S. V. Dalvi. Dated 23rd June, 1946.
 Captain Karamcheti Suryanarayana. Dated 17th July, 1946.
 Captain J. V. Nazareth. Dated 30th August, 1946.
 Captain Namuddin Ahmed. Dated 23rd September, 1946.
 Captain Jyotish Chandra Ghosh. Dated 26th September, 1946.
 Captain Satyendra Ramchandra Turkhud. Dated 6th October, 1946.
 Captain Bala Sahay. Dated 12th October, 1946.
 Captain M. R. Subha Rao. Dated 15th October, 1946.
 Captain Y. R. Shetty. Dated 16th October, 1946.
 Captain B. P. Sinha. Dated 27th October, 1946.
 Captain M. S. Khan. Dated 29th October, 1946.
 Captain Gangesh Kumar Roy. Dated 2nd November, 1946.
 Captain Siba Prasad Mitra. Dated 3rd November, 1946.
 Captain M. A. R. Chaudhari. Dated 11th November, 1946.
 Captain C. D. Iyengar. Dated 17th November, 1946.

INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)
(WOMEN'S BRANCH)

- Captain Divakar Shantaram Patkar. Dated 23rd June, 1946.
 Captain P. Subrahmanyam. Dated 4th July, 1946.
 Captain Fida Mohd. Khan. Dated 15th July, 1946.
 Captain (Mrs.) J. A. Karim. Dated 19th July, 1946.
 Captain (Miss) Sarah Abraham Shellim. Dated 29th July, 1946.
 Captain S. S. Godbole. Dated 24th August, 1946.
 Captain (Miss) Janaki Bair Vidur Raj. Dated 6th September, 1946.
 Captain Calambakkam Muthukrishnan. Dated 21st September, 1946.
 Captain Sudhindra Nath Ray. Dated 26th September, 1946.
 Captain Kartar Singh Jolly. Dated 26th September, 1946.
 Captain Ramendra Nath Dutta. Dated 30th September, 1946.
 Captain Saradindu Mukerjee. Dated 14th October, 1946.
 Captain C. F. Varied. Dated 17th October, 1946.
 Captain (Mrs.) Rose Swamikan. Dated 18th October, 1946.
 Captain Krishna Kumar Bose. Dated 30th October, 1946.
 Captain M. Rahimulla. Dated 31st October, 1946.
 Captain Michael Colaco. Dated 1st November, 1946.
 Captain Lekshumana Rajagopala Marthandam. Dated 4th November, 1946.
 Captain G. S. Ahmed. Dated 5th November, 1946.
 Captain (Mrs.) G. Barretto (née Neri). Dated 10th November, 1946.
 Captain B. Raghavan. Dated 14th November, 1946.
 Captain Vankatchalam Rajagopalan. Dated 15th November, 1946.
 Captain V. M. Rao. Dated 16th November, 1946.
 Captain B. B. Dutta. Dated 17th November, 1946.
 Captain P. C. Basu. Dated 20th November, 1946.
 Captain S. Zacharias. Dated 22nd November, 1946.

The undermentioned officer is permitted to relinquish his commission on grounds of ill health and is granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain S. C. Das. Dated 8th October, 1946.

The undermentioned officer is permitted to relinquish her commission on release from army service and is granted the honorary rank of Captain. Her services are replaced at the disposal of the Government of the United Provinces from date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain Miss Parin Tatanshah Edibam. Dated 19th November, 1946.

The undermentioned officer is permitted to relinquish his commission on reversion to the Indian State Forces :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain G. Mohammad. Dated 1st October, 1945.

RETIREMENT

Major G. W. Miller retires on account of ill health. Dated 29th December, 1945.

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Original Articles

POST-MORTEM APPEARANCES IN TROPICAL EOSINOPHILIA

By R. VISWANATHAN, B.A., M.D., M.R.C.P. (Lond.),
T.D.D. (Wales)

LIEUTENANT-COLONEL, I.M.S./I.A.M.C.

O/C Medical Division of an I.B.G.H.

As far as I am aware there has been no report in the medical literature of any case of death due to tropical eosinophilia. Hence the pathology of the condition has been a matter for speculation.

The following post-mortem report of a case that died of arsenical encephalopathy during the course of treatment for tropical eosinophilia should therefore be of interest.

An I.O.R., aged 28, was on active service with the Fourteenth Army for a year. During the last six months of his army life he suffered from cough with breathlessness and occasional asthmatic attacks. He was treated in the unit M.I. room off and on during the first five months of his illness. As the condition became worse he was admitted to one of the military hospitals where the diagnosis of tropical eosinophilia was made as his blood examination showed total white cell count of 28,000 with 44 per cent eosinophils. He was given two injections of N.A.B. 0.3 gm. at a week's interval. Twenty-four hours after the second injection the patient became unconscious and developed convulsions. The diagnosis of arsenical encephalopathy was made. Cerebro-spinal fluid was normal in every respects. He died 36 hours after the onset of cerebral symptoms. Just before death the total white cell count was 21,000, and eosinophils 7 per cent. As death was anticipated post-mortem examination under aseptic precautions was performed soon after death.

Post-mortem report.—The upper lobe of the left lung was adherent to the chest wall throughout its entire extent. The adhesions were recent and could easily be broken down. There was no fluid in either pleural cavity. There were dark reddish brown areas scattered over both the lungs. They were seen more extensively in the left upper lobe. Cut surface showed the same multiple dark reddish-brown areas varying in size from that of a split pea to that of a rupee. They appeared to be due to hæmorrhage and not consolidation. The affected portions of the lung did not sink in water. Some looked very much like the early stage of infarction. Bronchioles contained blood-stained mucopurulent secretion. The mucous membrane of the bronchioles was very much congested. Brain showed punctate hæmorrhages both in the white and grey matter. Mesentery showed a few areas of hæmorrhage. All other organs appeared normal to the naked eye.

Portions of brain and lung were removed under strict asepsis and sent to the laboratory for investigation.

Microscopic examination of stained section of the lung revealed the following. There were several areas of interstitial fibroblastic proliferation. Here the alveoli were lined with swollen cells and their lumina were partially or completely filled with macrophages and phagocytic monocytes. Some of these cells contained dark brown anthracotic pigment, others a small amount of hæmosiderin. But most of these cells contained eosinophilic granules grouped in one part of the cytoplasm. These granules containing cells were present in large numbers in the interalveolar spaces as well as within the alveoli. The partially consolidated areas were closely related to the terminal bronchioles. Evidence of emphysema was seen in other areas. In some of the alveoli the mononuclear cells had fused together to form very large giant cells. The nuclei varied from fifteen to twenty-five in number in each cell. They were all gathered together in the centre. In a few areas (see figure 1, plate V) a characteristic nodule formation could be seen. Each nodule consisted of four or five giant cells in the centre surrounded by a cluster of mononuclear cells. Evidence of recent hæmorrhage with marked engorgement of interalveolar capillaries was present.

The report on the samples of brain and lung tissue was as follows:—

1. Brain—Section shows congestion of brain tissue with some areas showing perivascular collection of mononuclear cells. Lung shows marked congestion, hæmorrhagic areas of bronchopneumonia and catarrhal changes in the bronchioles.

2. Rest of the tissue was emulsified separately in normal saline under aseptic precautions. The emulsions were lightly centrifuged to throw down the grosser matter and the supernatant fluid was taken out and was passed through seitz pads under negative pressure. 1 c.c. of the brain filtrate was inoculated intraperitoneally into guinea-pig no. 3. 1 c.c. of the lung filtrate was similarly inoculated into guinea-pig no. 2.

Guinea-pig no. 3 died after seven days. Post-mortem findings were:—

Stomach and intestines were empty. There was no peritoneal exudate. The heart stopped in systole, and contained no clot or blood. Lungs did not show any abnormality. Pericardial cavity did not show any exudate. Smear from the lung showed round cell preponderance and some wandering histiocytes. Some mononuclear cells showed immense phagocytosis of carbonaceous matter. A few eosinophils were also encountered.

Guinea-pig no. 2—Blood smears examined at intervals failed to show any increase in eosinophils over that seen before inoculation.

Discussion.—The hæmorrhages seen in the brain and lungs were probably due to N.A.B.

poisoning. Cellular changes in the lung are suggestive of chronicity. The affected areas are discrete and scattered. Interstitial tissue is the part mainly involved. Cellular infiltration is seen in some of the adjacent alveoli as well. The cells are mostly eosinophilic monocytes and eosinophilic polymorphs. The most interesting lesion seen is a tubercle-like nodule with a group of giant cells in the centre and a cluster of monocytes surrounding. It is definitely not a tuberculous lesion as these peculiar giant cells and mononuclears are never seen in tuberculosis. As the pathological process is in close relation to the bronchioles, it is in all probability bronchogenic in origin.

The histological changes described above make one assume that infection in tropical eosinophilia is probably by inhalation and that the infecting agent gets into the peribronchial tissue and sets up an inflammatory process involving the interstitial tissue mainly and alveoli partially. Discrete scattered areas of cellular infiltration, monocytic and eosinophilic, are produced. When the process becomes chronic nodules containing giant cells and monocytes are formed. The disseminated mottled shadows seen in the radiographs of cases of tropical eosinophilia and which last only for a short period are probably due to the areas of cellular infiltration with monocytes and eosinophiles. In some cases however the mottling lasts for months. In them the shadows might be due to the presence in large numbers of these giant cell nodules.

The histopathological appearances in this case are very suggestive of an infective process, rather than an anaphylactic reaction. The lesions are peribronchial and not perivascular.

It is extremely difficult to surmise about the nature of the infecting agent. All tests to prove a virus aetiology have been negative. The only observation which is suggestive of virus infection is the presence of perivascular cuffing with monocytes of brain capillaries. Can it be that the virus of tropical eosinophilia activated by arsenic produced the cerebral lesion?

Summary

1. Post-mortem report of a case of tropical eosinophilia is given.
2. Pathogenesis of the disease is discussed.

My grateful thanks are due to Major J. S. Greval, Officer in Charge of the Histopathological Department, Central Military Laboratory, Poona, and to Professors K. V. Krishnan and G. Sankaran of the All-India Institute of Hygiene and Public Health, Calcutta, for their help in this work.

EXPLANATION OF PLATE V

Fig. 1.—Low power. Note the tubercle-like nodule with giant cells in the centre surrounded by mononuclear cells.

Fig. 2.—High power. Oil immersion. Note the giant cells with 15 to 20 nuclei crowded together in the centre.

FOREIGN BODY LOCALIZATION : THE RING METHOD

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IN dealing with foreign bodies in the eye or orbit it is always necessary to know as accurately as possible their exact localization. The foreign body must be localized in space in relation to the central corneal point. It will be so many millimetres above or below, so many millimetres to the temporal or nasal side and so many millimetres posterior to this central point of the cornea.

If the foreign body is in the cornea or anterior chamber or on the iris direct clinical examination will reveal its exact position. In other cases the foreign body may be observed in the lens which is as yet transparent. Finally if the lens is clear a foreign body may be seen in the vitreous or on the retina. In this case it can be localized by direct ophthalmoscopic examination. In many cases however it cannot be seen clinically. It may be behind the iris or in the ciliary body. If the lens is opaque it will be impossible to see a foreign body in the vitreous, and for its proper treatment it will be necessary to decide whether a foreign body is in the vitreous or in the retina or whether it is extra-ocular in the orbit. An attempt should always be made to remove a magnetic foreign body in the globe in order to prevent the subsequent development of siderosis bulbi. If however a metallic foreign body is outside the globe but in the orbit it may be left alone as its retention seldom produces any further damage than has already been done.

Industrial accidents and injuries with retained foreign body are common in all industrial areas and will become more common with increasing industrialization.

During the last war injuries from fragments of shell, bomb, grenade, mortar and land mines have been very common and much experience has been gained in their localization. The method most frequently used for the localization of a retained intra-ocular or orbital foreign body during the recent war has been by means of the limbal ring. This was introduced into the Middle East by Graham (Stallard, 1942) but was apparently first used by Norman in Sunderland in 1915 (Ross, 1945).

There are many methods of foreign body localization such as those introduced by Sweet, Mackenzie Davidson and Comberg.

The disadvantage of these methods are however that elaborate apparatus or complicated calculations are required, and further the ophthalmic surgeon is not always certain that accurate centering of the eye and plate has been obtained.

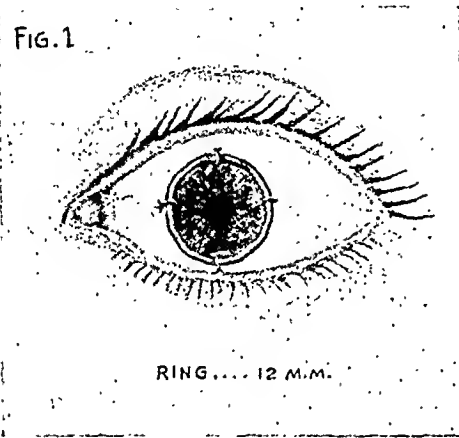
The contact lens method has the serious disadvantage that the contact lens often loses its

symmetrical position on the cornea during the taking of the x-ray picture which will produce fallacious results. Further, with the simple contact lens only the antero-posterior measurement is obtained.

The great advantage of the limbal ring method is that it is extremely simple, no complicated calculations are involved and the actual x-ray film shows whether accurate centering has been obtained. The only disadvantage is that a small minor operation must be performed in sewing the ring to the limbus.

Method.—After the preliminary 'straight' x-ray picture has demonstrated the presence of a foreign body a silver ring 12 mm. diameter and made of wire 1 mm. thick is sewn on the limbus with four sutures (figure 1). The usual

FIG. 1



aseptic precautions are of course taken and in most cases facial akinesia should be obtained by injection of novocaine into the facial nerve. The patient is then taken to the x-ray department and two pictures, antero-posterior and lateral, are taken. The tube should be about 30 inches from the plate so as to reduce the magnification to a minimum. The x-ray plate is placed in front of the patient's face close to the nose.

If centering has been correct the antero-posterior picture will show the ring as a perfect circle (figure 2, plate V) and the lateral picture will show it as a straight line (figure 3, plate V). If the eye has not been normal to the x-ray plate the antero-posterior picture will show the ring as an oval (figure 4, plate V) (instead of a perfect circle) while the lateral picture instead of showing a straight line will show a vertical oval shape (figure 5, plate V). The centre of the ring in the antero-posterior picture is now found either by geometrical construction or by eye. With a pair of compasses a circle is now drawn on the film whose centre is the same as the centre of the ring and whose radius is equal to the diameter of the ring, i.e. a circle is drawn on the film twice the size of the ring (figure 6). Now the actual diameter of the ring is 12 mm. so that the picture of the ring on the film (whatever the magnification at

x-ray) represents 12 mm. Thus the circle drawn on the film must represent 12×2 mm., i.e. 24 mm. diameter. Thus the outer circle

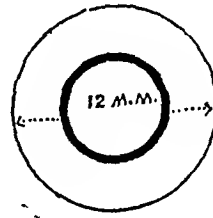


Fig. 6.

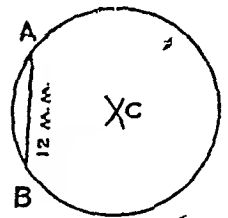


Fig. 7.

Right eye.

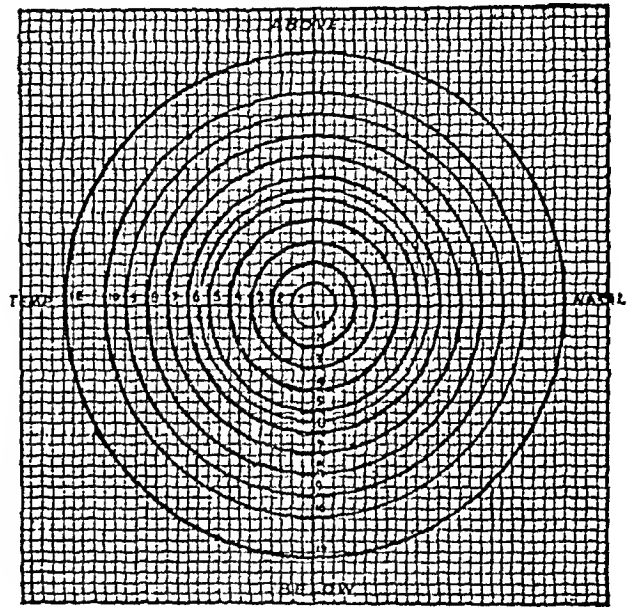


Fig. 8.

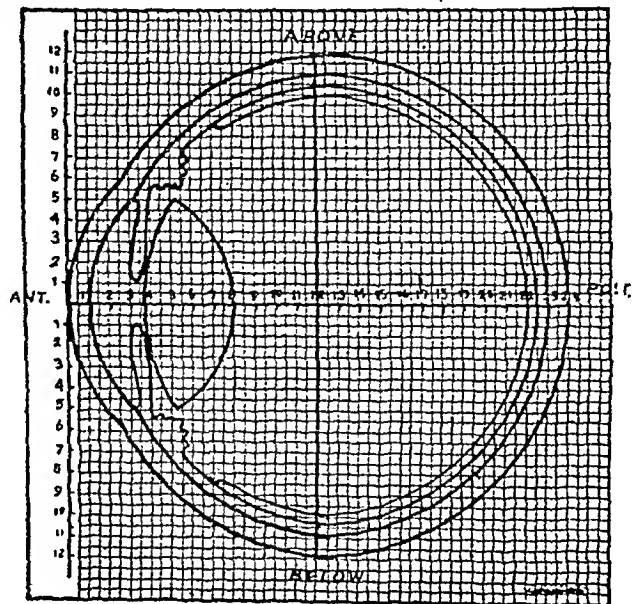


Fig. 9.

whatever its actual measurement on the x-ray must represent the sclera at the equator of the eye.

The actual diameter of the rings on the film is now measured and is usually found to be 13 mm. in the case of the smaller one, i.e. there is a magnification of $13/12$. The distance of the foreign body above or below the centre of the ring (central corneal point) is now measured and reduced by $12/13$. This gives the exact position of the foreign body above or below the central corneal point. Another measurement is

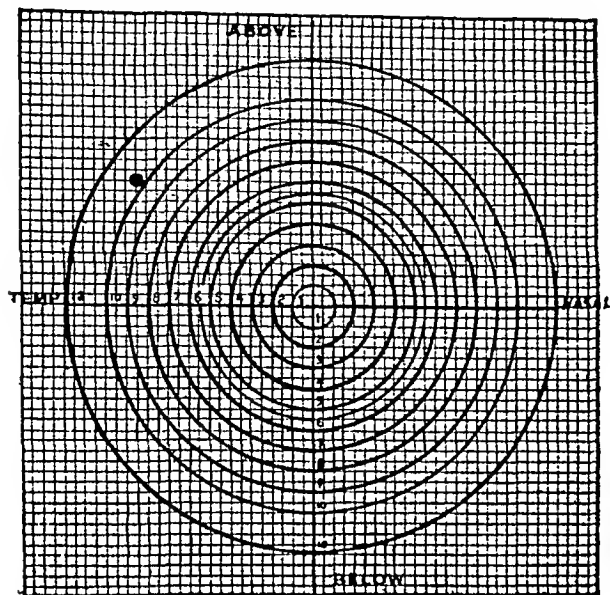


Fig. 10.

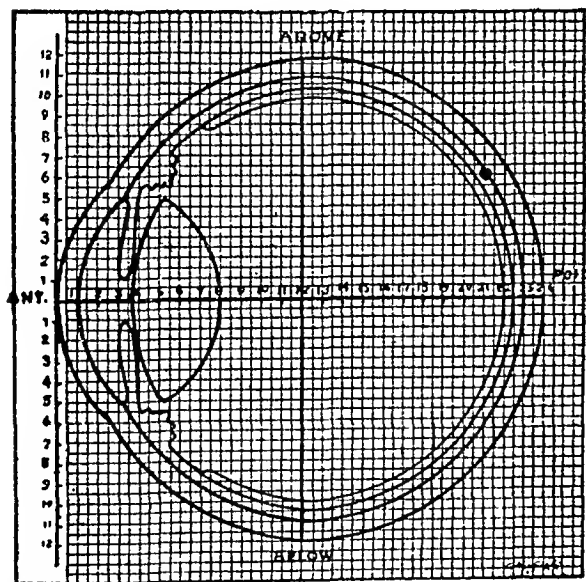


Fig. 11.

now made in the same way to ascertain the distance the foreign body is to the temporal or nasal side.

The lateral picture is now examined and with the compass point at the upper end of the ring (A in figure 7) an arc of a circle is described whose radius is equal to the diameter of the ring (AB in figure 7). The compass point is now placed at B and another arc of the same

radius is made to cut the former arc at C (figure 7). With the centre at C a circle is now described whose radius is equal to the diameter of the ring (representing 12 mm.) so that we now have a circle whose diameter represents 24 mm. and on which the ring (seen as a line) forms a chord. The circle thus drawn represents (whatever the magnification) the limits of the cornea and sclera seen from the lateral position. The point on the circle farthest from the ring thus represents the posterior pole of the eye. The distance of the foreign body posterior to the central corneal point may now be measured and the usual adjustment for magnification made.

The time taken to draw the circles and make the measurements is much less than it takes to write a description of them.

The measurements may now be plotted on a graph (figures 8 and 9). In most cases if the foreign body appears within the outer circle in

Right eye seen from above.

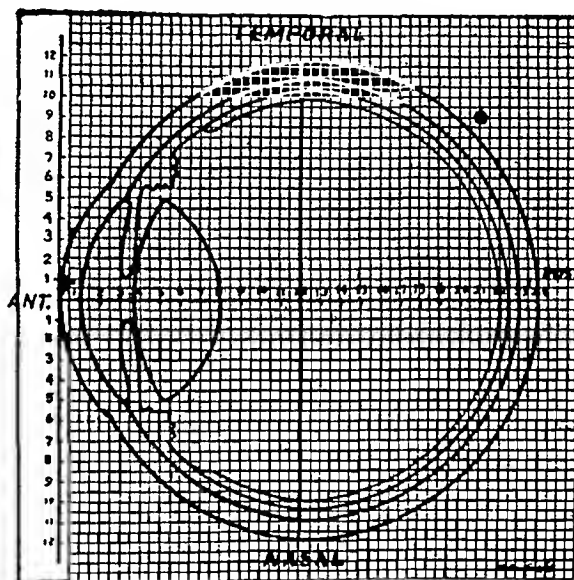


Fig. 12.

both the anterior and posterior and the lateral views it is usually intra-ocular but not always so. A horizontal projection should always be made. For example a foreign body which is 6 mm. up, 9 mm. temporal and 21 mm. posterior will appear within the outer rings in both anterior-posterior and lateral views (figures 10 and 11) but horizontal projection shows it to be outside the globe (figure 12).

Illustrative cases.—We have used this method of localization in about 50 cases and it has proved a very accurate method. The following case illustrates this :—

J. D., male, aged 25, was admitted to the Eye Infirmary, Medical College Hospital, with a history of injury by a mortar shell 12 days previously.

Examination: Right eye.—Vision, perception of light on the nasal and lower field only. Eye

quiet, no wound of entry seen. Cornea clear, pupil dilated and regular, lens clear. The vitreous was full of blood and no fundus details could be seen. The left eye was normal.

X-ray localization.—One foreign body about 2 mm. in diameter was seen to be 13 mm. to the nasal side, 13 mm. posterior and 1 mm. below the horizontal. The foreign body was thus localized to be on the sclera under the internal rectus muscle just behind the equator.

Operation was performed and the foreign body was found on the sclera under the muscle.

The case demonstrated that this method of localization can be accurate to 1 mm.

Another case is as follows:—

W. D., male, aged 27, was injured by a Japanese grenade about 70 days before being seen by us.

Examination: *Right eye.*—Vision 5/60. Cornea clear. No wound of entry seen. Eye quiet. Pupil dilated, lens clear. A yellow mass was seen on the retina at the equator in the 4 o'clock meridian. *Left eye* normal.

X-ray localization with the ring.—The foreign body (about 2 mm. in diameter) was measured to be 14 mm. posterior, 6 mm. nasal and 12 mm. below.

This corresponds with the mass of scar tissue seen ophthalmoscopically. No operation was performed in this case as the ophthalmoscopic and radiological evidence showed that the foreign body was in the scleral wall well sealed off in fibrous tissue and hence siderosis bulbi was not likely to supervene.

Comment.—X-ray of a 12 mm. silver ring sewn on the limbus is a very simple, yet very accurate, method of localizing intra-ocular and orbital foreign bodies. No complicated apparatus or elaborate calculations are necessary and the accuracy of the centering at the time of x-ray is apparent from the resulting pictures.

Summary

A description of the method of the localization of intra-ocular and orbital foreign bodies by means of the limbal ring is given and its accuracy shown by illustrative cases.

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CAUSE, SYMPTOMS AND TREATMENT OF LATHYRISM

A SPECIFIC NUTRITIONAL NEUROPATHY

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Introduction.—There is considerable difference in the description of symptoms in lathyrism by different authors.

Shah (1939) and Minehin (1940) report, besides spastic paralysis of the legs, also involvement of the arms and sensory impairment as

well. Minehin also noted affection of the bladder. Ruge and his co-workers (1925) and Ranjan (1944) described incontinence of urine and faeces as well as sexual impairment. It has been postulated that the disease is never progressive after a few days or weeks beyond the initial paralysis (Bicknell and Preseott, 1942). Ranjan (1944), however, notes rapid progress of the disease. The published accounts of the reflexes in lathyrism are equally puzzling. Minehin (1940) observed normal eremastic and abdominal reflexes along with spastic legs and extensor plantar responses. Trabaud and Mouharram (1932) found completely normal reflexes, including the plantar responses, though there was spasticity and clonus of the legs. A common symptom associated with lathyrism is night-blindness according to McCombie Young (1928), and Ranjan (1944) reports marked dimness of vision.

Even the diseases which can experimentally be produced in animals by feeding them on certain species of legumes of the genus *Lathyrus* have also been called lathyrism, although they do not show the characteristic symptoms of the human lathyrism. Geiger *et al.* (1933) fed rats with a diet consisting of *Lathyrus odoratus*, the flowering sweet pea (at levels of 80, 50 and 25 per cent of the diet). Characteristic symptoms were lameness, paralysis and contracture of the spine and sternum. In other experiments on white rats also fed with a *Lathyrus odoratus* diet, carried out by Lewis and Esterer (1943), these authors produced a disease which they call lathyrism showing the following symptoms: Incontinence, lameness, paralysis of limbs, spinal curvature of the thoracic region. Another nutritional disease by feeding sheep with a certain species of legumes, *viz.*, cull beans, has experimentally been produced by Willman and his co-workers. They call the resulting disease 'The Stiff Lamb Disease', which shows the following symptoms: The animal concerned has difficulty in walking and rising. It gets tired very soon after walking and tries to lie down whenever permitted to do so. On standing and walking there is disturbance of keeping the balance; later on, inability to rise at all, not even with help.

Since the author is working in an area where lathyrism patients are a common sight and since all of them show a uniform symptomatology, it appears advisable to establish first of all a record of the symptoms of this disease, which we regard in this area of Central India as indispensable for the diagnosis of lathyrism.

Symptoms.—The following trail of symptoms is in our experience found in every lathyrism patient:—

1. Spastic and painful rigidity in the muscles of the lower extremity, including loin muscles. From this results a typical spastic-ataxic gait, frequently associated with a so-called scissor-gait.

2. Exaggerated deep reflexes in the legs, generally clonus.

3. The complete absence of disease-symptoms in other parts of the body, especially in the upper extremity and the head.

1. The flexor and frequently also the adductor muscles of calf and thigh, particularly the M. gastrocnemius, feel hard and are tender on squeezing. All these muscles are invariably

well developed and never flabby or atrophic. The patients complain of permanent pain in these muscles which is increased on standing and walking. In more advanced cases even the sleep is disturbed due to the pains. The examination of passive movements shows permanent muscle resistance to flexion and extension at the knee- and hip-joints. The degree of this resistance runs parallel to the advancement of the disease. In very far advanced cases the resistance is such that it is not possible at all to achieve these passive movements by force. In this late stage all such movements are possible only by the patients themselves actively, very slowly and with the help of their own hands.

Most characteristic is the gait of the patients. The onlooker gets the impression as though these patients walk against the obstacle of their own muscles. They generally walk with a slight, apparently voluntary flexion at the knee-joints, which is associated or caused by a foot-drop, in an involuntary attempt to compensate for the latter, resembling the so-called Strümpell phenomenon. Or another way of involuntary compensation is achieved by swinging the leg in a convex arch instead of lifting the foot (circumduction). The patients seem to walk on their toes only. Another group of patients who do not show the above flexion at the knees will drag the feet on the ground, as though their soles are pasted to it. These patients describe their gait themselves as 'scratching the ground'. All these symptoms which appear on walking are 'associated movements, as they are known to occur in pyramidal lesions, but are not encountered in extra-pyramidal motor lesions nor in the normal individual. These modes of walking rather belong to the advanced stages of the disease. In the initial stages only the slight muscle resistance and the slightly bent knees on walking prevail. In many cases of all stages, in whom the spasm of the adductor muscles of the thigh dominates, the so-called scissor-gait results. The patients walk with crossed legs, resembling the somewhat opened blades of scissors. The movements of the arms, normally accompanying the gait of healthy persons, are always unimpaired in lathyrism. Walking and in more advanced stages standing of these patients is complicated by a peculiar kind of swaying (ataxia). This goes frequently along with fibrillary twitchings of the muscles of the lower extremity, which in combination with the contractures result in inco-ordinated movements. This disturbance of inco-ordination of different muscle groups is certainly the cause of this particular kind of ataxia of lathyrism patients. It is not due to cerebellar lesions, because the following tests exclude this type of ataxia :—

(a) There is no 'decomposition' in the sequence of complicated single movements.

(b) The test of moving the leg and big toe away from and back to the examiner's finger as a target, with eyes shut, does not show a

deviation in any direction (Barany's Pointing Test).

(c) If the patient is made to walk forwards and backwards with his eyes shut, he will not present the peculiar deviation of the so-called 'compass gait' (Krohn, 1938).

2. The following reflex reactions are also significant of pyramidal lesion. Without exception a greatly exaggerated knee-jerk is elicited, the ankle-jerks often being diminished or absent. In some cases, however, also the ankle-jerks are exaggerated. Almost always ankle-clonus is present and frequently also 'dancing of the patella'. Far advanced cases show—on sudden brisk passive dorsiflexion of the foot to elicit ankle-clonus—an involuntary complex reflex movement consisting of flexion at the hip-joint and flexion at the knee-joint. Frequently this 'flexion reflex' occurs already by a gentle stimulus, like deep pressure or pinching of the skin of the distal part of the lower limb. Either reflex, i.e. the flexion reflex as well as the increased deep reflexes, is indicative of hyper-irritability of pyramidal origin. So is the flexion reflex a prominent feature of the usual flexor contracture (the tendon reflexes being frequently decreased) and exaggerated deep reflexes are an equally characteristic feature of extensor contracture. The latter form is indicative of a less severe lesion than the flexor contracture (Babinski). Babinski's sign by stroking the sole along the lateral border rather than the median border is as a rule extensor and signifies a less severe pyramidal affection than does an extensor response elicited from the median border as well as from the lateral border of the sole (Krohn, 1938). There is electrically no reaction of degeneration. The senses of position and of movement are always and definitely unimpaired as well as the temperature and touch senses. The Romberg sign, if positive, is of little significance on account of the above described inco-ordination of muscle movements. The superficial reflexes vary : All or some of the abdominal reflexes as well as the cremasteric reflexes are in less advanced stages normally elicitable, but are missing in far advanced cases. This pathological abdominal reflex is generally associated with the 'flexion reflex' and the extensor plantar response all belonging to the order of 'reflexes of spinal automatism' and are signs of pyramidal involvement. Anyhow, re-appearance of the previously absent superficial reflexes and of a normal plantar response and the disappearance of the 'flexion reflex' are among the signs denoting improvement under successful treatment.

3. There are definitely no abnormal nervous signs whatsoever in any other part of the body. Never was any disturbance of sensation encountered, nor of the functions of the bladder, of the bowels, of the sex and of the mentality.

Examination of the cerebrospinal fluid as to pressure, cell count, albumin content and Kahn

test shows no abnormalities. There are also no pathological findings in urine and blood. Blood pressure is normal. Radiologically, lungs and shape of the heart are always found normal.

Differential diagnosis and aetiology.—By the well-defined signs, as described above, lathyrism can be diagnosed with full certainty. There is only one other disease, the signs of which are identical with lathyrism, that is spastic spinal sclerosis of Erb (Beaumont, 1942) or the pure spastic type of amyotrophic lateral sclerosis of other authors (Price, 1941). Both diseases are caused by lesions in the upper motor neurone of the pyramidal tract. The lesion of 'spastic spinal sclerosis' is confirmed by post-mortem examinations. Records of post-mortem examinations of the spinal cord and the cerebrum of lathyrism patients appear not to be in the literature.

But the difference between these two nervous diseases does not lie in a divergence of their signs. Their only difference is the aetiology. Whereas we are not aware of the cause of spastic spinal sclerosis, the cause of lathyrism is well known, *viz*, consumption of certain species of legumes of the genus *Lathyrus* for a period of usually not less than about a month. This consumption is, therefore, to be regarded as indispensable for the diagnosis of lathyrism. We in this area of Central India found invariably that it was only *Lathyrus sativus* (teora or khesari dal) that was consumed by our patients. To the same conclusion comes also Shourie (1945) in his comprehensive review of lathyrism in Central India. This experience does, however, not exclude the possibility that other species of *Lathyrus* may also cause nutritional diseases which may more or less resemble the disease which is our subject.

Ruge and his co-workers state that besides *Lathyrus sativus*, *Lathyrus cicera* and *Lathyrus clymenum* also can cause lathyrism. But they associate with the disease disturbance of sensation, urine incontinence and impotency. Epidemics in France in 1770 and in England in 1785 were thought to be caused by eating vetches of the species *Lathyrus cicera*. This or *Lathyrus clymenum* was held responsible for an outbreak in Syria (Traubad and Moubarram, 1932), but Shah (1939), investigating an outbreak in a Punjab village in 1939, found that seeds of *Vicia sativa* and not of *Lathyrus* had been eaten mixed with corn. McCombie Young (1928), however, reports that his cases had eaten *Lathyrus* but little or no *Vicia sativa* and Minchin (1940) describes 'lathyrism without *Lathyrus*'. The latter's diagnosis appears rather doubtful in the light of our above stated experience. In connection with McCombie Young's report on *Vicia sativa* being the cause of lathyrism, examinations of *Lathyrus sativus*-stocks, as consumed by lathyrism patients, in the Imperial Agricultural Research Institute, New Delhi, failed to reveal the presence of *Vicia sativa* seeds (quoted by Shourie, 1945). The above quoted experiments on animals also show that legumes other than *Lathyrus sativus* are apt to cause nutritional diseases somewhat similar to lathyrism (Geiger *et al.*, 1933; Lewis and Esterer, 1943).

Course of lathyrism.—With regard to the onset of the disease we entirely depend on the patients' own reports. About 30 per cent of

them state that before the occurrence of the first symptoms there was fever with shivering, resembling malaria. Frequently, this statement was confirmed by malaria relapses taking place in our presence in the hospital. A minority of all lathyrism patients—less than 20 per cent—remember to have had diarrhoea previous to their falling sick from lathyrism. Actually, we found occasionally amoeba in their stools. It is, therefore, quite possible that the latter diseases acted in these cases as a conditioning cause for the deterioration of a latent background disease, *viz*, vitamin B deficiency state, on which the toxic influence of *Lathyrus* was grafted. On the other hand, the majority of our patients did not give any history of a previous disease. All our patients are, however, unanimous in their statement that the disease, generally during or after the rainy season, started slowly, at first only with heaviness in their legs, followed by gradually increasing pains in the loin, thigh and calf muscles. These symptoms deteriorate to the cripple stage, unless consumption of teora is discontinued. Even if it is continued in a mixture with wheat, containing about 50 per cent of teora, the condition goes on deteriorating. But if consumption of teora is completely stopped, the condition remains steady, showing neither improvement nor further deterioration. The latter statement of the patients could be confirmed by our own observation in the hospital; there was in a batch of eight patients neither improvement nor deterioration for a period of a month, in which no treatment was given. We must, however, mention in this connection that during this time of observation the hospital diet itself was deficient, consisting mainly of chapattis about 8 oz. and of dal about 2 oz. and occasionally of ghee 1 oz. and of milk 6 oz. per day.

Nutritional background.—Besides the consumption of a special variety of *Lathyrus*, very important for the type of symptoms appearing in different parts in the world, is in our view the nutritional background of lathyrism. Although we have not had the facility to prove this experimentally, by giving the same amount of teora to one volunteer with normal nutritional background and to another volunteer with deficient nutritional background, clinical experience shows that outbreaks of lathyrism occur at all times and in all countries only among the poor and ill-fed classes of people.

Special observations on the particular ingredient deficient in the diet are reported by McCombie Young (1928). He stresses a vitamin A deficiency among his lathyrism patients. He not only found night-blindness common in a village suffering from lathyrism, but also noticed that the disease did not occur in neighbouring villages, where the diet contained as much *Lathyrus* but more vitamin A, fish and meat; while Shah (1939) has reported great improvement in patients, when vitamins A and D were given. Apart from night-blindness no apparent deficiency diseases have been reported as occurring with outbreaks of lathyrism. A latent vitamin B₁ deficiency however is suspected as a result of the investigations on serum phosphatase of lathyrism

patients by Rudra and Bhattacharya (1946) in Patna. They found a high serum phosphatase and a consequent possible cocarboxylase deficiency in lathyrism and related these findings to the aetiology of the disease. They consider it, however, also possible that the high serum phosphatase is the effect and not the cause of lathyrism. But, of course, lack of other substances in the diet, apart from vitamins, may be important, as suggested by Basu *et al.* (1937), who found that the seeds of *Lathyrus sativus*, which often form the staple food in famine villages, are a very poor source of protein, being especially deficient in tryptophane.

The author (Jacoby, 1946) has found in this area here that the nutritional background of a vast proportion of the population is a vitamin B complex deficiency. Although symptoms of this deficiency are visible in only about 14 per cent of our lathyrism patients, the result of the therapeutic test (*see* under treatment) suggests that a latent vitamin B complex deficiency exists in a far greater proportion. It is a hitherto unexplained fact that in lathyrism villages the disease attacks generally only one or two members of a family, but leaves the others untouched who eat the same food and live under the same conditions. Children are affected roughly in the same proportion and manner as adults, but the female sex to a much smaller proportion as compared with the male sex. In Shourie's (1945) statistics only about 13 per cent were females.

Treatment.—This present description of the curative influence of prostigmin in lathyrism is based on the analysis of 50 patients treated with prostigmin.

There has been no effective treatment of lathyrism until now. Jacoby (1946a), however, discovered that lathyrism responds well to prostigmin treatment. This response differs in degree in the different stages of the disease.

The first stage in our classification comprises all those patients who can walk with slightly bent knees and only some active and passive resistance in their muscles as well as with the just noticeable scissor-gait and slight muscle pain. Their deep reflexes are, of course, greatly exaggerated, the superficial reflexes as a rule being normal and plantar response extensor, elicitable from the lateral border of the sole. No 'flexion reflex' is present. In this stage an apparently complete clinical cure is achieved through and during the treatment with prostigmin injection; in the beginning about 10 intramuscular injections of 2 c.c. are given daily, after which a course of another ten daily injections with 1 c.c. only follows. Afterwards, injections on alternate days may be sufficient to keep the achieved condition unaltered. If the treatment is discontinued, we invariably found a re-occurrence of the former symptoms. It was not possible to substitute, either for the short-term or the long-term treatment, the injections by tablets of prostigmin. The tablets have proved to be ineffective in lathyrism.

The required duration of the treatment of lathyrism with prostigmin is thus the same as in *Myasthenia gravis*. Discontinuance of the

treatment causes re-occurrence of symptoms in either disease.

The second stage in our classification of lathyrism comprises the more advanced cases with marked painful muscle spasm and a clearly visible spastic ataxic scissor-gait. Muscular fibrillations are present. These patients are still in a position to walk, although with considerable difficulty and discomfort, either just without or preferably with one or two sticks, according to the advancement of the case.

The treatment of this stage with prostigmin injections does not achieve the same result as in the first stage. The symptoms are only considerably relieved, but it is generally only possible to reach an improvement which resembles the earlier first stage in our classification. Those who were previously able to walk with the described obstacles, but without a stick, can under the influence of the prostigmin treatment walk like untreated first-stage patients, and those who required the stick are enabled to walk without it.

The third-stage patients are those who are permanently confined to bed. The muscle spasm and contractures are so extreme that they prevent practically any movement with the legs. The pains in the muscles of the lower extremity, of the calves, thighs and loins are permanent and severe. These patients have thus become cripples. At the same time all other functions of the body are unimpaired, the vegetative as well as the mental functions. The reflexes are such as we have described under 'symptoms' for the far advanced stages. The prostigmin-injection treatment in this third stage achieves little with regard to the crippled state of these patients, but succeeds in so far as the pains almost disappear and the muscle rigidity becomes less. This results sometimes in an ability of these patients to leave their bed, slowly crawling on the floor for short distances. These third-stage patients are, of course, not in a position to work. The patients, however, who belong to the first and second stage, are by the treatment with prostigmin enabled to do almost every kind of work.

The achievements under prostigmin treatment can in every case and stage be accurately checked and even measured in the following way: The exaggeration of the knee- and ankle-jerks becomes less and in early cases practically normal so that also the clonus may disappear; the extensor Babinski response in the early cases will equally approach the normal. If in the more advanced stages the superficial reflexes were not to be elicited before, they will reappear in the course of the treatment and the 'flexor reflex' disappear. The most accurate evidence of improvement is the gait, which can be measured as follows: The patient is asked to walk in his usual manner with wetted feet on the dry floor. The heel-to-heel distance is measured with a tape. This distance shows under prostigmin treatment a marked diminution

of about 3 to 6 inches. *Vice versa*, if the injections are discontinued, the length of steps slowly increases again till after about a month the original length is regained. The symptom which shows improvement last is the ataxia. It takes about 20 daily injections before the patients can for instance stand quietly on one leg, or are able to stop walking immediately on sudden order. Before the treatment they were not able to do so but had to proceed one or two steps further in order to keep their balance. The improvement of ataxia can generally not be achieved in late stages. We tried to enhance the effect of the prostigmin treatment by administering at the same time massage, light or electric treatment to the lower extremities of lathyrism patients. We did not, however, find any response to these methods.

Vitamins.—Several authors report improvement of the disease by the administration of certain vitamins. Ranjan advises plenty of vitamin A besides all other vitamins and Ahmad (1944) reports relief of pains and regained ability to walk about freely after parenteral and oral administration of vitamin B. Mellanby (1934) classes lathyrism among the deficiency diseases, since protective foods containing vitamin A and carotene, green vegetables, milk and eggs can prevent the detrimental effects of the toxic agent in the *Lathyrus* peas.

Strongly against the argument of vitamin deficiency causing the disease is the fact that in our experience the administration of vitamins in large doses does not improve the condition to any significant degree. We have tried in different batches these vitamins A and D in the form of cod-liver oil for a period of two months. We administered the vitamins B₁, B₂ complex with crude liver and the vitamin C daily by oral and parenteral route for a period of one month. But no response was ever apparent. On the other hand, we do not know of any vitamin deficiency state which does not respond at least to some extent to the therapeutic application of the deficient vitamin alone or in combination with the other common vitamins.

Another clinical evidence against the view of vitamin deficiency being the cause of lathyrism, is the feature that no visible sign of any such deficiency occurs in the bulk of our lathyrism patients. Only about 14 per cent showed symptoms of vitamin B complex deficiency in the form of a characteristic glossitis, showing also the so-called inkspots. That is a very small percentage in view of the high incidence of vitamin B deficiency states, which the author (Jacoby, 1946) found in this area. These facts show that the cause of lathyrism is surely not a deficiency of the above-quoted vitamins as tried by us therapeutically. This statement, however, is in no contradiction of the likelihood of the presence of a *latent* vitamin deficiency, forming the clinical background upon which the *Lathyrus* grain may exercise its toxic effect on the nervous system.

Two important factors have induced us to believe in the existence of such a background: firstly, the nature of food which the lathyrism patients commonly consume. They live practically on *teora* and *dal* only. Few of them can very rarely afford some milk and green vegetable also. As a rule they do not eat fish, meat, eggs and fruits. This diet resembles in quantity and quality (except for *teora*) the diet of those people among whom a great percentage in this area suffers from the different stages—latent and visible—of vitamin B complex deficiency (Jacoby, 1946). There is therefore much likelihood to presume that the majority of lathyrism patients here also live in a permanent, although invisible, i.e. latent, state of vitamin B complex deficiency.

Secondly, our practical observation at the bedside of lathyrism patients has taught us that the response to prostigmin is more immediate and more marked if vitamin B complex treatment precedes the prostigmin treatment. In a few cases this vitamin treatment seemed even indispensable to the usual prostigmin effect.

On the strength of these two clinical experiences of ours we have made it a rule to give to our lathyrism patients first a course of about 12 vitamin B complex, fortified with 1 c.c. of crude liver extract, injections before starting on prostigmin treatment.

Prevention.—It is the duty of public health authorities in all countries to prevent diseases rather than to cure them. The tackling of the disease 'lathyrism' represents such a public health problem to be undertaken by men of science in unison with the state's administrations. It seems to be a tough task, because of its manifold implications. In any case, science has given the lead in this field also by dispersing any mysticism as to the cause of this disease. To put the verdict of science in a nutshell: No lathyrism without consumption of *Lathyrus*.

The first task resulting from this scientific knowledge is enlightenment of the public. The writer has found that the villagers in lathyrism-affected places are alive to the fearful consequences of *Lathyrus* consumption. They have been taught this lesson being confronted daily with the sight of their crippled brethren who have consumed *teora*. The next task of the authorities concerned with the promotion of public health is a statistical one; a study of the incidence of lathyrism in former years and now. On the initiative of the former Revenue Minister of Bhopal State, Sir C. C. Garbett, such a study was undertaken by a nutrition expert (Shourie, 1945) for the year 1944-45. It estimated the occurrence in this district as 'at least 1,200 cases'. Since then no further statistical data have been available and the writer depended, therefore, on observations of individuals. The writer has attempted to gather such observations as originate from police officials in

charge of the villages concerned. They point to an increase in the incidence of lathyrism there during the year 1946.

Whatever significance might be given to such reports in view of the absence of official data, the writer has actually come across and treated patients whose disease represents new outbreaks in 1946. If this fact of new outbreaks in 1946 or of an increase in the incidence of lathyrism in general is recognized and appreciated by the authorities, the third task should be a legislative one. This should not prove too difficult, since this district (Bhopal) is a grain surplus area. The awareness of the villagers to the fearful consequences of teora consumption had apparently not the effect of inducing them to leave teora voluntarily to cattle only instead of using it for their consumption. They should, therefore, be prevented by law from consuming teora themselves. This ought to be a humanitarian duty and should not be governed by any other consideration. Such a step was in fact taken in November 1945 by the Department Commissioner of Jubbulpore, banning the sale of teora in the Sihora tehsil.

Along with the legal prohibition of teora consumption should go the scientific research with a view to investigating a mixture of teora mixed with other grains, i.e. mainly of wheat, in which the proportion of teora is too small to exercise its toxic effect on men. Such research, which the writer had no facilities to carry out, would be of greatest importance in view of the present world food scarcity, because it would assist in overcoming this scarcity by stretching the available food resources with the help of teora, which grows abundantly even on rocky soil in spite of hailstorm, blight, excess of rain, etc.

Summary

Lathyrism is a specific disease of the pyramidal tract, due to the consumption of teora, a species of the genus *Lathyrus*, in this area of Central India. A full account of its manifestations and a description of the treatment with prostigmin injections is given. The rôle, which vitamins, if deficient in the diet, play in the causation and treatment of the disease in men and experimental animals, is discussed. Suggestions for the prevention of the disease are made.

Acknowledgment

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POST-MORTEM EXAMINATIONS IN THE PUNJAB : AN ANALYTICAL STUDY OF 669 EXAMINATIONS FROM 1923 TO 1944

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A STATISTICAL generalization of disease incidence based on post-mortem findings has its drawbacks as well as its advantages. In India where autopsies among the not-too-poor class of patients in the hospitals and the private patients outside are 'taboo', where the subjects are mostly unclaimed bodies of beggars, vagrants and inmates of jails and asylums an adequate cross-section of the population cannot be said to come on the post-mortem table. A considerable wastage of valuable post-mortem material could be avoided and more comprehensive population groups could be studied if the pathologists were associated or worked in co-operation with the police surgeon, a practice which obtains at only a few places in India. The statistical advantage of post-mortem findings lies in the fact that the basic pathology is discovered which ultimately led to death by a terminal disease of minor import which however is more likely to be entered as the cause of death in the clinical records.

With the appreciation of the above facts an analysis of the available autopsy records of the

department of pathology of the King Edward Medical College, Lahore, is being presented. For the sake of uniformity and to facilitate comparison the investigation is much on the same lines as that of Gharpure (1927, 1928) on his Bombay material.

The sources of the material have been the general wards of the Mayo Hospital attached to the college and the Punjab Mental Hospital, Lahore. A comparison of the admission, death and post-mortem figures during the years under survey (1923 to 1944) is not very encouraging to the pathologist. The average autopsy rate works out at 5.9 per cent of the deaths. This does not compare unfavourably with the overall percentage of 4.9 arrived at by Tribedi (1941) in his analysis of autopsy figures of 10 main centres in India.

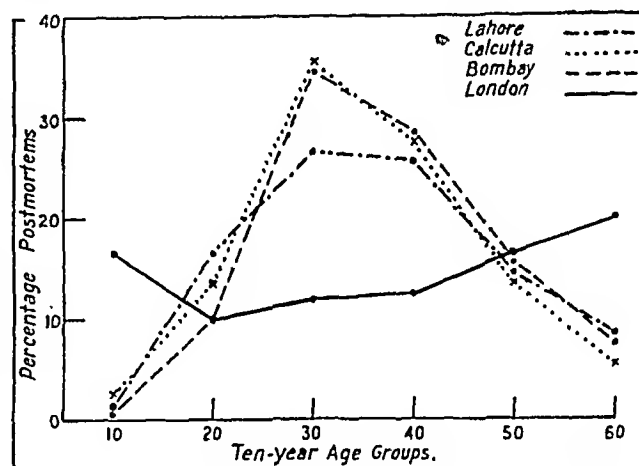
However, while the admissions to the hospital rose from 5,604 in 1923 to 9,452 in 1944 with a corresponding increase in deaths from 393 to the peak figure of 722 in the year 1942 there is no comparable increase in the number of post-mortem examinations. The autopsy percentage of deaths has ranged between 10.0 and 2.5 with the figures for the years 1939 to 1942 working out at 5.4 per cent, 3.2 per cent, 3.6 per cent and 2.5 per cent. The years 1943 to 1944 show an increase to 9.1 per cent and 8.9 per cent only because of the large number of cases referred from the mental hospital. As many as 46 and 33 out of 60 and 49 post mortems performed during the years 1943 and 1944 respectively were from the Punjab Mental Hospital. Only 14 and 16 post-mortem examinations were asked for from the Mayo Hospital during these two years out of 653 and 556 deaths giving an autopsy percentage of 2.1 and 2.8 for these years. The significant fact brought out is the progressively decreasing number of post-mortem examinations called for from the wards in spite of the increasing volume of admissions and deaths. The total period covered is long enough but the number of autopsies involved is perhaps not very large with the possibility of returning a fallaciously high percentage of some diseases while others may not be represented as adequately as they would be in a larger collection.

TABLE I

Percentage mortality according to age groups at different centres

	Lahore	Calcutta	Bombay	London
Up to 10 ..	1.2	2.5	0.78	16.9
" 11-20	16.8	13.4	10.7	10.2
" 21-30	27.6	35.3	34.2	12.1
" 31-40	26.9	27.4	28.6	12.3
" 41-50	14.8	13.3	15.8	16.5
" 51-60	8.8	5.8	7.9	20.0
Over 60	3.9	1.9	3.16	12.0
" 50	12.8	7.7	11.0	32.0
" 40	27.6	21.0	26.9	48.5

In common with figures for Calcutta and Bombay the highest death incidence is recorded in the third decade as against the sixth amongst Londoners (*see chart*). The contrast between the steep rise and fall of the curve round 30 in the Indian figures with the almost horizontal London curve from 10 onwards is well brought out in the graph. This is easily explained by post mortems in children barring foundlings being extremely rare in India and by the shorter expectation of life.



A perusal of admission and death figures during the years 1923 to 1944 shows the total admissions for Hindus and Muslims 64,056 and 79,344 respectively (the total death figures by community not being available), total post mortems amongst Hindus being 244 as against 288 amongst Muslims—a proportion roughly parallel to the admission figures. An examination of the age incidence percentage (table II)

TABLE II

Percentage mortality by community according to age groups

Age	Hindus	Muslims	Sikhs
1-10	0.45	0.45	..
11-20	6.5	5.9	0.1
21-30	10.0	10.7	0.8
31-40	9.5	10.01	1.6
41-50	3.7	6.4	1.3
51-60	2.1	3.5	0.7
61-70	0.3	1.2	0.3
71-80	0.1	0.6	0.1

of these two communities shows no difference in deaths in the earlier years of life while the Muslims provide slightly higher figures in the latter decades suggesting a possible difference

in longevity amongst the two communities. The statistical significance of the figures and the conclusion is perhaps of doubtful value but is offered as an incidental inference.

The respiratory diseases claim the largest number of deaths—nearly one-third of the total if pulmonary tuberculosis is included and one-fourth without it (table III). Deaths from tuberculosis (including pulmonary) show a

TABLE III
Percentage mortality against various disease groups

Tropical diseases	..	9.1
General	..	6.8
Tuberculosis	..	11.2
Circulatory diseases	..	9.7
Respiratory diseases	..	25.5
Nervous diseases	..	7.7
Digestive diseases	..	14.4
Urinary diseases	..	7.9
Malignant growths	..	3.1
Others	..	4.6

surprisingly low percentage in comparison with the London and other Indian figures. A conclusion that the incidence of tuberculosis in this part of the country is as low as suggested by the figures would be unwarranted for the reasons, firstly, that tuberculosis bed accommodation in the hospital during the period of survey was very small and, secondly, very advanced cases are either not admitted or removed from hospital before fatal termination.

Over 60 per cent of tuberculous disease is confined to the lungs—the commonest manifestation being a chronic fibrocaseous lesion with cavity formation (table IV). Out of 46 deaths

TABLE IV
Percentage of total mortality from different types of tuberculosis

Generalized miliary	..	..	..	2.9
Pulmonary	..	..	..	6.8
Peritonitis	..	..	..	0.59
Meningitis	..	..	..	0.59
Primary intestinal	..	..	..	0.1
Others	..	..	..	0.1

from pulmonary tuberculosis two were from acute pneumonic phthisis. In two adults the lesions were of the typical childhood type of tuberculosis with a much more marked caseous lesion in the hilar and tracheo-bronchial glands than the tuberculous focus in the lung parenchyma itself. An unusually interesting case showed in the walls of right and left auricles tuberculous masses of the size of hen's eggs with endocarditis in left auricle. There was a nodule of the consistency of a gumma on the upper

surface of the cerebellum on the right side and a smaller nodule on the anterior aspect of the left frontal lobe. The lungs and liver showed a condition of chronic miliary tuberculosis.

The incidence of deaths from tropical diseases is recorded much lower than elsewhere in India although the dysenteries account for nearly half the deaths in this group as in Bombay (table V).

TABLE V
Percentage of total mortality due to tropical diseases

Malaria	..	..	..	1.3
Plague	..	..	..	1.9
Cholera	..	..	..	0.1
Amoebic dysentery	..	..	..	1.1
Liver abscess	..	..	..	1.5
Bacillary dysentery	..	..	..	2.8
Ancylostomiasis	..	..	..	0.45

The bacillary would appear to be the commoner of the two dysenteries from the figures but this interpretation should be taken with reserve. It is more reasonable to take it that the acute bacillary cases come more often to the post-mortem table than the acute amoebic types and that these figures do not, therefore, reflect the relative frequency of the two diseases. The fact that more deaths are recorded from amoebic liver abscess than amoebic dysentery is a pointer in this direction.

Kala-azar and beri-beri are almost non-existent in this part of the country while relapsing fever is uncommon and cholera is seen only in epidemic form. The last case of plague post mortem was in 1926 when there was an epidemic in Lahore.

Amongst the general diseases the incidence of typhoid is high and leukaemia also shows a fairly high incidence (table VI). The lymphatic type

TABLE VI
Percentage of total mortality due to general diseases

Anæmia (including 2 cases of Banti's disease)	..	..	..	1.2
Leukæmia	..	..	..	1.04
Diabetes	..	..	..	0.59
Septicæmia and toxæmia	..	..	..	3.1
Typhoid fever	..	..	..	1.9

was met with more often than the myeloid in the ratio of 4 to 3. One case each of hydrophobia, blackwater fever, congenital syphilis, icterus gravis neonatorum formed part of the series. Six cases have been labelled as pernicious anæmia and two of Banti's splenomegalic anæmia. Almost 1 per cent of total mortality from this cause gives the lie to the popular belief amongst the clinicians about the non-existence of pernicious anæmia in this part of the country. These cases were diagnosed on

the basis of hæmatological findings, histamine-fast achlorhydria, neurological signs in three cases, and marked degenerative changes in the viscera. Two of these post-mortem examinations were reported by Taylor and Chitkara (1940) along with clinical reports of three other cases from their wards.

Respiratory diseases, as already pointed out, form the largest single group in the incidence of mortality and 78 per cent of this group is constituted by the pneumonias—broncho and lobar—which occur with equal frequency. No predilection was noted in the lobar type for any one lung. About 7 per cent of the deaths in this group were ascribed to pleurisy and empyema, nearly 3.5 per cent to lung abscess and 5.2 per cent to gangrene. According to these figures 9 per cent of inflammatory conditions of the lung parenchyma are likely to go on to abscess and gangrene (table VII).

TABLE VII
Percentage of total mortality due to
respiratory diseases

Lobar pneumonia	..	..	..	10.1
Broncho-pneumonia	..	..	..	9.9
Pleurisy and empyema	..	..	..	1.6
Lung abscess	..	..	..	0.9
Gangrene	..	..	..	1.3
Bronchitis	..	..	..	0.9
Others	..	..	..	0.7

Pericarditis is found to be the condition most frequently responsible for deaths among diseases of the circulatory system accounting for nearly one-fourth of the cases. Nearly 18 per cent of cardiovascular cases were those of endocarditis, rheumatic being twice as frequent as the other two forms of endocarditis. Thus, over 12 per cent of deaths due to cardiovascular diseases are accounted for by endocardial lesions of the rheumatic type (table VIII). This confirms the

TABLE VIII
Percentage of total mortality due to diseases of
circulatory system

Endocarditis—				
(a) Subacute bacterial	..	..	..	0.3
(b) Ulcerative	..	..	..	0.3
(c) Rheumatic	..	..	..	1.2
Pericarditis	..	..	..	2.1
Atheroma	..	..	..	0.4
Arteriosclerosis (renal)	..	..	..	0.3
Aneurysm	..	..	..	0.7
Syphilis	..	..	..	0.5
Others	..	..	..	4.0

clinical observations of Hughes and Yusuf (1930) and of Wig (1935) in this part of the country.

Detailed histological studies have not been made on these cases but the gross appearances and exclusion of other types of endocarditis leave

no doubt about the nature of the condition. The high incidence of pericarditis may be taken as corroborative evidence of rheumatic agency in cardiac morbidity. The combination of endocarditis and pericarditis accounting for 20 per cent of cardiovascular cases is another pointer in this direction. It may be pointed out that Kutumbiah (1940) has carried out detailed histological studies on his material in South India and produced conclusive evidence of the existence of rheumatic lesions in the heart. Rheumatism is thus shown to be not as uncommon in the tropics as is commonly believed by British workers. Atheromatous changes in the blood vessels are a common observation in most cases over thirty years of age but advanced atheromatous disease as the sole cause of death was found in only 3 out of 65 deaths from cardiovascular diseases. Aneurysmal dilatation was the cause of death in 5 cases. Rupture of the heart occurred in one case of myomalacia cordis. Two congenital abnormalities met with were one case of stenosis of the conus arteriosus and one of patent foramen ovale. Syphilitic lesions of the myocardium were seen in one case which showed fairly marked patchy fibrous scars, and perivascular round cell infiltration while aortic involvement was much more frequent.

The percentages of deaths for the digestive diseases appear rather high but this is due to the inclusion of peritonitis (non-tuberculous) under this heading. With the exclusion of these cases the percentage works out at 8.3 per cent comparable to those from other sources. The post-mortem figures bear out the extreme infrequency of peptic ulcer observed clinically in this part of the country, only one case of gastric ulcer having been encountered in the series of 669 post-mortem examinations. Cancer on the other hand is relatively less rare, there being three cases. That fatal hæmorrhage from the stomach may take place without evidence of any gross lesions in the stomach wall was our observation in one of the recent post-mortem examinations. Peritonitis alone has a death incidence of 6.1 per cent, the majority of the cases being appendicular in origin (table IX).

TABLE IX
Percentage of total mortality due to diseases of
digestive system

Peptic ulcer	..	..	..	0.1
Enteritis	..	..	..	2.5
Intestinal obstruction	..	..	..	1.3
Tuberculosis of intestine	..	..	..	0.5
Peritonitis	..	..	..	6.1
Cirrhosis of the liver	..	..	..	2.6
Others	..	..	..	1.3

Cirrhosis of the liver claims an incidence of nearly two and a half per cent, only one case being biliary in type for 17 of the multilobular variety. Hæmatemeses is recorded as the

commonest cause of death, hæmorrhage into the omentum occurring in one case. Affections of the respiratory tract, the kidney and the peritoneum in a descending order of frequency are the closing chapters in this condition. That more cases die of surgical conditions of the gastro-intestinal tract than of medical is a conclusion arrived at by an analysis of the post-mortem figures.

Nephritis is the most important cause of death amongst kidney diseases, about 35 per cent cardiac failure most often ringing in the curtain in these cases (table X). A little less frequent

TABLE X

Percentage of total mortality due to urinary diseases

Nephritis	..	..	..	2.9
Uræmia	..	..	..	2.0
Tuberculous kidney	..	..	..	0.4
Polycystic kidney	..	..	..	0.3
Others	..	..	..	2.0

is the surgical disease of the urinary tract in the form chiefly of lithiasis or obstruction from an enlarged prostate. Death from renal failure is recorded in two cases due to polycystic kidney, in one case in association with polycystic condition of the liver. The case with polycystic kidney had lived to the age of 35 years before death resulted from uræmia although the kidneys at autopsy were found to be riddled with cystic cavities containing thin watery and colloid-like material with hardly any renal tissues. Out of three cases of tuberculosis of the kidney one failed to show a tuberculous lesion elsewhere in the body.

Over 50 per cent of deaths from diseases of the nervous system are due to meningitis exclusive of the tuberculous type. Of those nearly 30 per cent are meningococcal while the remaining are metastatic infection or the result of spread from contiguous lesions mostly in the middle ear. Syphilitic meningitis is recorded once in thirty-one cases of meningitis as also one case of gumma of the brain in the whole series. Cerebral and cerebellar cyst and abscess, meningioma,

TABLE XI

Percentage of total mortality due to diseases of the nervous system

Meningitis	..	..	..	4.0
Apoplexy	..	..	..	1.6
Extracerebral hæmorrhage	..	..	..	0.59
Syphilitic meningitis	..	..	..	0.1
Transverse myelitis	..	..	..	0.3
Encephalitis	..	..	..	0.1
Others	..	..	..	1.03

hæmorrhage of the pituitary and encephalitis were recorded once each in the whole series (table XI).

Malignant disease is responsible for 3.1 per cent of the deaths having been encountered 21 times in the present series of post mortems. The possibility of fallacy from an unreserved generalization from post-mortem figures is well illustrated by the fact that not one of these cases was cancer of the uterus or breast. The only case of breast cancer died of secondary growths in the skull bones and dura mater eight years after mastectomy without any local recurrence. It must however be remembered that the females provided just about 6 per cent of the post-mortem material under investigation. Over 57 per cent of the malignant growths were in connection with the gastro-intestinal tract, the stomach being the site most often involved (table XII).

TABLE XII

Percentage of total mortality due to malignant growths

Cancer liver (secondary)	..	..	0.7
Cancer stomach	..	..	0.4
Cancer cæcum	..	..	0.3
Cancer œsophagus	..	..	0.1
Cancer lung	..	..	0.1
Malignant melanoma (rectum)	..	..	0.1
Malignant endothelioma (peritoneum)	..	..	0.1
Malignant papilloma	..	..	0.1
Retroperitoneal sarcoma	..	..	0.1
Lymphosarcoma	..	..	0.1
Sarcoma rib	..	..	0.1
Hypernephroma	..	..	0.1
Cancer breast (secondary deposit in skull)	..	..	0.1
Cancer prostate (secondary deposit in colon)	..	..	0.1
Teratoma testicles (secondary deposit in lung)	..	..	0.1
Glioma motor cortex	..	..	0.1

Secondary growths were present in the liver in almost all these cases. No proved case of primary carcinoma of the liver was found in the series. The only teratoma met with was found associated with secondary deposits in the lungs.

A case of unusual interest in the series was one of complete transposition of viscera, both thoracic and abdominal.

Summary

An analysis of 669 post-mortem examinations carried out in the Pathology Department of the K. E. Medical College, Lahore, during the years 1923 to 1944 is presented. The inadequacy of autopsies in spite of the increasing admissions and deaths in the attached hospital is commented upon.

The incidence of mortality is distributed as follows:—

General diseases 7.9 per cent, tropical diseases 7.9 per cent, circulatory diseases 9.7 per cent, respiratory diseases 25.5 per cent, nervous diseases 8.6 per cent, digestive diseases 13.0 per cent, urinary diseases 7.9 per cent, tuberculosis 11.2 per cent, and malignant growths 3.1 per cent.

Respiratory diseases are responsible for the highest mortality. Nearly 35 per cent of deaths from kidney diseases are due to nephritis.

Pernicious anæmia is shown to be not as rare in this part of the country as believed.

Peptic ulcer is extremely uncommon.

Kala-azar and beri-beri have not been met with in the whole series.

Incidence of deaths from tuberculosis is recorded low and reasons are given for it.

Malignant growths in the series have been found most common in the gastro-intestinal tract.

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PREDIGESTED PROTEIN FOODS

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IN recent years, the nutritive value of predigested protein foods is attracting widespread interest among nutritionists. In view of the present scarcity of good sources of protein, such as meat, eggs and milk, consideration must be given to the value of other protein foods to feed the population and specially for rapidly restoring the badly undernourished millions at the present moment of food crisis. It is a well-known fact that sufficient protein must be taken along with our food in order to meet the normal requirements of the body to maintain proper health. The ingested protein must be broken down by hydrolysis in the digestive tract before it can be absorbed through the gut. The physical condition of a food may, however, prevent the digestive juices from penetrating to the proteins and acting on them. If, therefore, the proteins are broken down by enzymes outside the body, they would be more completely utilized. Further, it is known that certain amino-acids and peptides act as co-enzymes for proteolytic enzymes which are responsible for the digestion of proteins. Thus, if the preparation contains hydrolysis products also, i.e. amino-acids and peptides, these digestion products activate the enzymes, thereby augmenting the digestive capacity of the juices. In fact, amino-acids are necessary for certain enzymatic reactions to take place.

In cases of starvation, sufficient food is not available for meeting the normal bodily requirement. The body reserves are so depleted that they adversely affect the proper functioning of the digestive enzymes. This extreme state of disturbance in normal digestion and metabolism leads to diarrhoea and subsequent death. It is

now claimed by many workers that treatment with predigested protein food results in dramatic improvement in such cases. In addition to its value in the treatment of cases of starvation, it has proved a valuable food for premature infants and children with digestive disorders and in the treatment of gastric ulcers. It is also invaluable as an easily assimilable protein food for infants, invalids and as a general protein supplement for even normal persons. It is the object of the present note to review the available literature relating to the use and value of the various preparations of predigested protein products in nutrition and medicine and to evaluate the experience of other workers in the use of the products together with a brief description of the preparation of such products from vegetable sources.

Treatment of malnutrition.—A form of predigested food known as 'F-Food' or famine food containing amino-acids, glucose and vitamins has been used for feeding the starving population of the liberated European countries. Recently, protein hydrolysate products prepared from edible meat was used in the treatment of extreme cases of starvation in the Bengal famine of 1943, where even intravenous glucose administration was of no use (Mukerji, 1945).

Other uses.—Patients who have been deprived of nourishment because of carcinoma of the stomach or some other gastric disorder have been successfully treated in America by intravenous injection of hydrolysed casein. It is also being administered to patients in order to hasten the regeneration of blood plasma after severe loss of blood from war wounds. These preparations, therefore, are likely to form part of the routine hospital treatment of cases in which there is a deficiency of plasma protein.

Feeding of premature or undernourished babies.—Preparations of hydrolysed casein are now being used for the feeding of premature or undernourished children. Although human milk is superior to all other foods for growing children, it is not the ideal nourishment of infants who have begun their extra uterine life too early. Further, the high calorie requirements of these infants together with the lack of proper functioning of their digestive organs, make it necessary to supplement breast milk—which on account of its low caloric value places a high demand on the digestive organs—with other foods which are easily assimilable and rich in protein. Recently, highly significant results have been obtained by the use of amino-acid mixtures as additional food for premature infants (Magnusson, 1944). A mixture of amino-acids obtained by enzymatic digestion of casein mixed with glucose to supply calories and salt mixture to meet the salt requirements is found to be the ideal food for premature infants. A comparative study of the increase in weight of infants by feeding undigested casein on the one hand and amino-acid mixture on the other has shown that the gain in weight was considerably

greater when amino-acid mixture was being administered. The preparations used in these studies had the following composition:—

Amino-acid mixture ..	25 per cent
Glucose ..	25 per cent-
Salt mixture ..	1.5 per cent

The mixture was given through a catheter along with breast milk during first few days of life and later fed by mouth. The preparations are stated to be well tolerated by infants without any complications such as vomiting or digestive disturbances.

'Protein hydrolysate' preparations.—Predigested foods consisting of 'protein hydrolysates' are now being manufactured by a number of pharmaceutical firms in America. A brief description of these products with their methods of preparation may be of interest.

The preparations as at present used are of two kinds: (1) a solution of amino-acids prepared by acid digestion or enzymic digestion of protein, particularly casein, for intravenous use, and (2) preparations obtained by digesting protein (casein or meat) with enzymes, which contain amino-acids, peptides and also peptones and albuminoses for oral use. These preparations are frequently used admixed with glucose and vitamins in feeding the starving population of some of the liberated European countries.

The disadvantage of acid digestion process is that tryptophane is destroyed during the process, and therefore it should be replaced by adding tryptophane to the final product. On the other hand, in the enzymic digestion process the tryptophane remains intact. The predigested food which, otherwise known as 'F-Food' which has been in use in Europe, is a mixture of amino-acids, glucose and vitamins. It is stated that two litres of the product is equivalent to about 50 gm. of protein.

Other types of preparations which are intended for oral administration consist of spray-dried solid material obtained by digesting casein or meat with enzymes. These preparations contain mixtures of amino-acids, peptides and peptones. Vitamins can be added to this powder. It is generally administered by mouth or by stomach tube.

Preparations used during the last Bengal famine of 1943.—The preparation of protein hydrolysate product from edible meat, rich in amino-acids, has been described by Mukerji (1945). This preparation was used during the last Bengal famine of 1943 for treatment of cases of starvation. Highly successful results were obtained during the famine period. In view of its valuable therapeutic properties and its regular use by the medical profession, the author has described certain sets of standards to be followed by all pharmaceutical concerns taking up the manufacture of this product, and a tentative monograph on the subject drawn up in accordance with the B.P. is given. This

preparation is intended for intravenous administration. The method of preparation is described.

New sources of food protein.—The protein hydrolysates described above are generally prepared from casein or meat. In view of the present scarcity of animal products, it is necessary to find adequate alternatives. Increased interest has recently developed in the nutritive value of plant proteins which may partially replace or substitute proteins of animal origin. Various oil bearing seeds can be used as a source of food protein after extraction of oil, e.g. groundnut, sesame and coco-nut.

Groundnut is rich in high class protein. In addition, it is a rich storehouse of vitamins, particularly vitamin B₁ and nicotinic acid. At present, the cake after removing the oil by mechanical expression is used largely as food for animals and as manure. The utilization of this by-product of the groundnut oil industry as food material for humans has not been feasible, because it is lacking in certain qualities. A process has been developed in these laboratories for the preparation of predigested food from groundnut cake.

Groundnut cake is finely powdered and passed through a 40-mesh sieve. To one part of the powder about 4 parts of water are added and brought to a temperature of 70 to 75°C. A solution of papain is added to the suspension and digested for 4 to 5 hours. The whole mass is then filtered in a filter press and the filtrate is concentrated to a moisture content of 20 to 25 per cent. The concentrate is then steamed at 5 pounds pressure for half an hour and stored in stoppered bottles. This method of obtaining the predigested protein food results in a product containing the bulk of protein, vitamins and minerals originally present in the cake. The product is palatable and thus aids in its general acceptance. The residual material obtained after extraction of the hydrolysate contains some quantity of undigested protein, carbohydrates and minerals which could be used as a stock feed after drying.

The following is the analysis of the product obtained from groundnut cake after processing:—

Chemical composition of predigested protein food from groundnut cake

Water ..	25.7%
Total nitrogenous extractives ..	60.8%
Non-protein nitrogenous extractives ..	46.6%
Proteoses ..	32.2%
Peptones ..	9.9%
Amino-acids ..	4.5%
Amino nitrogen as per cent of total ..	11.8%
Ether extractives ..	0.24%
Ash ..	4.12%
Phosphorus ..	0.336%
Calcium ..	0.068%
Iron ..	0.0064%
Vitamin B ₁ ..	8-10 µ g./gm. (260-330 I.U./100 gm.).
Nicotinic acid ..	290 µ g./gm.

The analysis shows that it contains 55 to 60 per cent of proteins and their breakdown products. Four teaspoonfuls (drachms) will contain about 6 gm. of protein (which is about the same amount of protein as present in one egg or 1 oz. of meat) in a completely predigested form.

The predigested protein concentrates from groundnut cake offer a good substitute for meat and meat products. A suitable mixture of groundnut, cottonseed and sesame flour, predigested and concentrated, would certainly turn out to be a first-class article of food.

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MALE HORMONES FOR THE PREVENTION OF RELAPSES IN MALARIA

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A NUMBER of methods and of drugs are employed in the after-treatment of malaria with the aim to prevent relapses. The known antimalarial drugs are unable to do so; in fact, some of the drugs have also the property to precipitate a relapse. I used salvarsan for some time with quite satisfactory result but gave it up when I had a relapse which proved fatal. Therefore, I was looking for some measure which would not be provocative and would be of value in the prevention of relapses.

I could observe in a number of patients who had frequent relapses that these relapses recurred at regular intervals, so that the next attack could be predicted accurately. A regular interval between the relapses has also been observed by Noe, *et al.* (1946) in chronic south-west Pacific malaria, and Nocht and Mayer (1937) described periodical relapses after three weeks. In my cases the interval was between three to four weeks.

The regular recurrence made me suspect that in these cases some cyclical activity of the body might be responsible for the precipitation of the relapses. The interval of about four weeks—or a multiple thereof—points to the menstrual cycle as the periodical activity eventually responsible for the recurrence. Closer scrutiny of ætiological and of clinical features reveals a number of facts which indicate the participation of female or oestrogenic factors in the mechanism of malaria. The following facts seem significant:—

1. Malaria is transmitted by the female anopheles only.

2. It has been observed by many authors that female gametocytes are more numerous in the blood than male gametocytes; female gametocytes have been found to predominate in the relation of from 3 to 1, up to 6 to 1.

3. It is stated that in relapses chiefly female forms are seen in thick drop preparations (Nocht and Mayer, 1937).

4. A great incidence of abortions and of premature births in women suffering from malaria has been observed by many authors. In this connection it may be recalled that administration of œstrin during pregnancy may lead to abortion.

5. Malaria is said to cause impotence, sterility and frigidity in a number of cases. Animal experiments have shown that injections of œstrin will lead to change of the sex characteristics, and may eventually cause atrophy of the gonads.

6. It is generally stated that women are possibly more susceptible than men to malarial infection.

In view of the above facts I concluded that the inhibitory effect of male hormone might help to suppress and to counteract those factors which are responsible for the periodical relapse. Administration of testicular hormone has the effect that follicle maturation and luteinization are suppressed, the vaginal changes of œstrus are absent, and that menstruation (in monkeys) is completely inhibited.

For the present investigation only cases of *vivax* infection were selected, as these have a greater tendency for relapses. One week after routine treatment of the attack nine of these patients were given four injections of perandren (testosterone propionate) on alternate days. The patients have been under observation for a period of 6 to 8 months after the administration of perandren. During this period all of these cases had an inoculation with T.A.B. vaccine which could have provoked a relapse. None was seen after the inoculation. One of the nine patients had a true relapse, while two had 'relapses' of an unexpected nature during the period of observation. A short description of some of the cases is given below:—

1. C. A., male, 46 years old, had his first attack of malaria in 1944. Patient had also a syphilitic infection, and therefore he was allowed to have a number of fever bouts before treatment was given. In spite of simultaneous arsenic treatment, patient had a number of relapses. After his last relapse on 2nd October, 1945, he was given four injections of testosterone propionate one week after treatment of the relapse. On the 2nd November, 1945, he returned to hospital with another relapse. On each occasion *P. vivax* rings were found in the blood.

2. V. C., male, 32 years old, had attacks of malaria in July and August 1945. On each occasion *P. vivax* rings were found in the blood. On 23rd September, 1945, he had another relapse. After treatment of the relapse he was given four injections of testosterone propionate. On 24th October, 1945, he returned to hospital complaining of chills. A blood slide was taken which showed *P. vivax* rings. However, the

chill was not followed by any rigor or fever, and patient left hospital after a few hours. Before leaving hospital he was given another injection of 10 mg. of perandren. 48 hours after the first chill, patient returned to hospital with chills, and this time it was followed by rigor and fever. Another slide was taken, and it showed now only *falciparum* rings. Further course was uneventful, and the patient has not had any further relapse since.

3. B. C., male, 39 years old, had a massive and serious *vivax* infection on 31st August, 1945. After treatment of the attack he was given 40 mg. of male hormone. He returned to hospital on the 24th December, 1945, complaining of chills. Temperature was 98.6°; a smear was taken and showed *falciparum* rings only. The chill was not followed by any fever, and the patient left hospital without having any further treatment. Subsequently he did not develop any further chills, nor has he had any relapse since.

4. D. E., male, 30 years old, had an attack of *vivax* malaria on 8th September, 1945. He was readmitted with a relapse on 5th October, 1945. On admission he had a slight temperature, chill, pains in the joints and abdomen. The next day he was given an injection of male hormone in addition to mepacrine tablets. On the 7th afternoon he had a fever paroxysm of 104°. After this attack of fever the patient had no further paroxysm, nor was any provoked by the other injections of perandren which were given subsequently on alternate days. Patient has not had any relapse since.

In none of the other five cases was there any relapse after the injections of male hormone nor was there any untoward reaction.

Comment.—Only one out of nine cases of relapsing malaria which were given perandren injections as after-treatment had a real relapse. Two other cases had chills, but no fever, though parasites were found in the blood smear. It is noteworthy that when male hormone was given in the preliminary stage, as in cases 2 and 4, this was followed by a fever attack; however, the patient had no paroxysm thereafter. No fever was caused by the injections of testosterone propionate in those cases which were injected one week after the actual attack.

It has to be mentioned that all patients felt much better after the injections of male hormone, and that they had a speedier recovery from the debilitating effects of the malaria attack. This may be attributed to the tonic effects of testosterone propionate. Korenchevsky *et al.* (1941) investigating the effect of testosterone propionate on liver, kidney and heart found that it possesses hepatotropic, nephrotropic and cardiotropic effects.

The number of cases is admittedly too small to draw any definite conclusions, but the results seem of sufficient interest, so as to warrant further investigations. It is possible that the dosage used in the present series was too small

and that larger doses, e.g. six injections of 25 mg., might be given.

I want to thank Messrs. Ciba (India) Limited for the supply of perandren.

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THE TREATMENT OF INTESTINAL WORMS WITH THE INDIGENOUS DRUGS BUTEA, EMBELIA AND KAMALA*

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THE indigenous drugs Butea, Embelia and Kamala have been used in India as anthelmintics from ancient times and they were even included in the *British Pharmacopæia* for some time. Although the authors of books dealing with the indigenous drugs speak highly in general terms of these three anthelmintics, in only one instance do we find that any facts and figures have been given. Caius and Mhaskar (1921, 1923) treated 32 cases of hookworm infestation with a single dose of 10 to 40 grs. of powdered Butea seeds; only a small number of hookworms were passed, and no case was cured microscopically. With the same dosage only 2 out of 26 cases of ascariasis were cured. Embelia given in 2 to 4 dr. doses in a single administration was ineffective in 24 cases of hookworm, and in 4 dr. doses in 8 cases of ascariasis. Kamala was similarly ineffective in 1 to 1½ dr. doses in 7 cases of hookworm infestation and in 2 dr. doses in 3 cases of ascariasis.

Chopra (1933) stated that 'fresh seeds of Butea, ground in the form of a powder, proved to be very efficacious in ascariasis, almost at par with santonin in a series of 30 cases, whilst in another series, the results were disappointing'.

Having seen in Sanskrit literature that the combination of these drugs was sometimes prescribed, we decided to try these drugs again individually and in combination with one another.

Methods of Administration and Dosage

Fresh seeds of *Butea frondosa* (Beng.—Palash) and the dried fruits of *Embelia ribes* and *E.*

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robusta (Beng.—Biranga or Baberung) were purchased locally and ground up finely. Kamala, the minute red glands and hairs of *Mallotus philippinensis*, was available as a coarse powder but it was also ground up finely.

For the treatment of hookworm and ascaris infestation, no preliminary purgative was given. The drugs were mixed with sugar and water into a paste and administered either at bed time into a paste and administered either at bed time three hours after the last meal of the day or in the early morning before any food had been taken (marked as 'single doses' in the tables). In some instances two doses were given, one at bed time and another early the next morning (marked as 'double doses' in the tables). When the drugs were given at bed time, a dose of sodium sulphate solution was given the next morning and two hours after the morning dose of the anthelmintic in other instances. No food was allowed till the bowels were moved satisfactorily. To ensure bowel movements the dose of sodium sulphate was repeated, if necessary, after two hours. When the drugs were given daily for more than one day, sodium sulphate was given at the end of the treatment.

For *Tania* and *Hymenolepis* infestations a preliminary purgative was given in every instance.

The age of the youngest patient in our series was 4 years. We found that children below this age could not swallow the drugs properly. Some of the older children and a few adults vomited either soon after taking the dose or later after the dose of salts. Most of the patients, however, retained the drugs and did not complain of any abdominal pain or show any untoward symptoms.

For children up to 12 years, 8 to 30 grs. of each drug according to age was given, for adolescents 40 to 45 grs. and for adults 60 grs. or more.

The preliminary diagnosis was made by finding of ova (or segments in the cases of *Tania*) in the stools examined by large smear method and also by Lane's Direct Centrifugal Flotation (D.C.F.). It was not possible to count the worms passed after the treatment as many of the patients were treated in the out-patients' clinic. In the case of the in-patients, hookworms were occasionally seen and ascaris in many. For the criterion of cure, we depended upon the disappearance of the ova from the stools examined by the two methods mentioned above at least ten days after treatment. For cases of *Tania* infestation, we followed up the cases, and if segments reappeared in 6 to 12 weeks, these were marked as 'not cured'. We may mention here that we examined the stools of many cases of taeniasis in our series for three days after treatment, but no scolex was found in any of them.

A small number of patients, not cured by one treatment, was given a second and third treatments at an interval of 10 to 15 days.

Hookworm

The results of treatment with the different drugs are shown in table I:—

TABLE I

Dose in grains	Frequency	Number treated	Number cured
<i>Butea</i>			
15-30	Single	8	1
60	"	20	0
120	"	4	0
10	T.d.s. for 3 days	1	0
<i>Embelia</i>			
60	Single	2	0
120	"	1	0
180	"	8	1
<i>Combined Butea and Embelia</i>			
15 each	Single	3	1
20 "	"	5	1
20 "	Double	5	1
30 "	Single	14	0
30 "	Double	3	0
40 "	Single	2	1
45 "	"	7	3
60 "	"	22	1
60 "	Double	2	1
90 "	Single	24	0
120 "	"	41	2
150 "	"	13	1
180 "	"	7	1
20 "	Once daily for 6 days	1	0
20 "	T.d.s. for 3 days	4	0

Results of second and third treatments.—Eight cases were given single doses of *Butea* with one cure; two cases were given a third treatment—no cure. Two cases were given *Embelia* (single dose) with one cure. With combined *Butea* and *Embelia* 2 out of 22 were cured after second treatment, and 1 out of 5 after third treatment. (One patient was given a fourth treatment with a single dose of combined *Butea* and *Embelia*, but even then he was not cured.)

It will be seen from table I that the drugs have no appreciable effect against hookworms.

Ascaris

The results of treatment of ascariasis are given in table II:—

TABLE II

Dose in grains	Frequency	Number treated	Number cured
<i>Butea</i>			
8	Single	1	0
15	"	2	0
18	"	3	0
20	"	1	1
22	"	6	0
24	"	3	1
28	"	5	1
30	"	3	1
60	"	10	7
120	"	2	1

TABLE II—concl'd.

Dose in grains	Frequency	Number treated	Number cured
<i>Embelia</i>			
30	Single	2	0
60	"	5	1
60	Double	1	0
90	Single	1	1
120	"	2	1
180	"	1	1

Combined Butea and Embelia

10 each	Single	5	1
15 "	"	3	0
15 "	Double	7	1
20 "	Single	13	3
20 "	Double	23	1
25 "	Single	5	2
30 "	"	26	7
30 "	Double	29	2
40 "	Single	15	3
40 "	Double	1	0
45 "	Single	8	4
60 "	"	26	10
60 "	Double	18	6
90 "	Single	13	8
90 "	Double	2	1
120 "	Single	31	17
150 "	"	5	4
180 "	"	2	1

Combined Butea, Embelia and Kamala

10 each	Single	4	1
15 "	"	2	0
20 "	"	7	1
30 "	"	6	0
60 "	"	6	3

Results of second and third treatments :—

Butea

Second treatment: Six cases given 15 to 30 grs. (single)—not cured; two cases given 60 grs.—both cured.

Third treatment: Given to two cases (22 and 28 grs.)—not cured.

Combined Butea and Embelia

Second treatment: 20 to 30 grs. of each given to twenty cases, 2 cured; 40 to 45 grs. given to 5, 2 cured; 60 to 120 grs. given to 8, 6 cured.

Third treatment: 15 to 30 grs. (double) given to 4, one cured.

Combined Butea, Embelia and Kamala

Second treatment: 10 to 30 grs. of each given to 4, none cured.

Third treatment: 10 grs. of each given to 1—cured.

It will be seen from table II that the cure rate was better with the larger doses than

with the smaller ones. The result from this point of view is shown in table III :—

TABLE III

Drug	Dose in grains	Number treated	Number cured
Butea	8-30	24	4
	60-120	12	8
Embelia	30	2	0
	60-180	10	4
Combined Butea and Embelia.	10-30	111	17
	40-45	24	7
	60-180	97	47
Combined Butea, Embelia and Kamala.	10-30	19	2
	60	6	3

With doses of 60 grs. and more, Butea and Embelia have definite ascaricidal properties. (We did not try Kamala alone for either hook-worm or ascaris.)

About half the number of cases were cured by one treatment with 60 grs. or more of these two drugs either singly or in combination.

The cure rate compares very favourably with that of santonin and oil of chenopodium. Maplestone and Mukerji (1931) treated 90 cases with one dose of santonin curing 31 cases only. With oil of chenopodium, 37 were cured in a series of 67 cases. Butea and Embelia and therefore better than santonin and equally as effective as oil of chenopodium for ascaris.

Tania

Altogether 56 cases were treated by the different drugs. As we had to depend upon the after history to find out the end-result, we tried to follow up all these cases, but we succeeded in 34 cases only. The result of the treatment of these 34 cases are shown in table IV :—

TABLE IV

Drug	Dose in grains	Frequency	Number treated	Number cured
Embelia	60	Single	6	0
		Repeated after one hour.	2	1
	120	Single	4	1
		Repeated after one hour.	1	1
	180	Single	4	0
		"	"	"
Combined Butea and Embelia.	90 each	"	1	0
	120 "	"	2	0
	180 "	"	1	0
Combined Embelia and Kamala.	30 "	"	1	0
	60 "	"	2	0
	90 "	"	1	0
	120 "	"	9	0

A second treatment with *Embelia* was given to 2 patients (60 grs. and 120 grs. single doses respectively) but still they were not cured. Similarly combined *Embelia* and *Kamala* (single doses of 120 grs. each) failed in 2 cases. None of these drugs, therefore, appear to have any appreciable effect in *Tania* infestations.

Hymenolepis nana

Out of 30 cases treated, only one was cured as will appear from table V :—

TABLE V

Drug	Dose in grains	Frequency	Number treated	Number cured
Butea	60	Single	2	0
Embelia	120	"	4	0
Kamala	30-120	"	6	0
	10-20	T.d.s. for 3 days	4	0
Combined Butea and Embelia	20 each	Once daily for 3 days	1	0
	30 "	Single	2	0
Combined Embelia and Kamala	10-30 "	T.d.s. for 3 days	2	0
	30 "	B.d.s. for 3 days	1	0
	30 "	Single	1	0
Combined Butea, Embelia and Kamala.	15-60 "	"	7	1

Discussion of Results

It is evident that these drugs have little effect against hookworm, *Tania* and *Hymenolepis nana*, but Butea and Embelia have decided ascaricidal properties. The doses of these drugs, however, cannot be reduced proportionately for children without lowering of their anthelmintic action. This fact was also noted by Maplestone and Mukerji (1938) in the case of oil of chenopodium for treatment of ascariasis in children. The explanation offered was that the worms were just as large in children as they were in adults—hence the smaller doses failed to clear them out. On the other hand it might be argued that the smaller volume of the child's intestine should give a concentration of the drug in a reduced dose approximately equal to that given by a full dose in the intestine of the adult. Another explanation offered was that the majority of the intestinal helminths more readily infected younger animals than adults, so the power of these worms of maintaining themselves was greater in the more susceptible child than it was in the more resistant adult—hence they are not so easily dislodged from the former as they are from the latter by the same treatment. We are inclined to believe that the lowering of effect caused by the reduction of the dosage of Butea and Embelia for children is due to this factor.

One disadvantage is the bulk of these drugs. This can be rectified to a certain extent by making compressed tablets.

The main advantage, however, lies in the cost; one dose of two dr. of the drugs costs less than one pice (at the current price of As. 10-0

per lb.); one 3 gr. dose of santonin costs 3 annas (at the current price of Rs. 27-0-0 per ounce) and one 1.5 c.c. dose of oil of chenopodium costs about 2 annas (at the current rate of Rs. 32-0-0 per lb.). Moreover, the ascaridol content of oil of chenopodium is liable to deteriorate in the tropics as shown by Mukerji and Sen Gupta (1945). Butea and Embelia are, therefore, efficient and cheap substitutes for santonin and oil of chenopodium in the treatment of ascariasis.

Summary

1. The indigenous drugs Butea, Embelia and Kamala were tried in hookworm, ascariasis, *Tania* and *Hymenolepis* infestations of man.
2. These drugs have no effect on hookworm and tapeworm.
3. Butea and Embelia are better than santonin and equally as good as oil of chenopodium in the treatment of ascariasis.

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PAUL-BUNNELL TEST IN THE DIAGNOSIS OF GLANDULAR FEVER WITH REPORT ON SEVEN CASES

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GLANDULAR fever, which is synonymous with infectious mononucleosis or monocytic angina, is an acute, febrile, infectious adenitis with a characteristic increase of mononuclear blood cells. Clinically, the most impressive features of this disease are its protean manifestations, its extremely variable severity and its almost

invariably favourable termination. Numerous epidemics have been described; the degree of contagiousness is probably low. Sporadic cases are frequent. The disease is widely spread but no authentic case of this disease has been recorded in India according to Tidy (1937) and no such case has been reported even to this date. The present communication is, therefore, intended to draw the attention of members of the medical profession to this clinical condition, a few cases of which have been clinically diagnosed and confirmed by carrying out Paul-Bunnell tests at this Institute. The test is based on the accidental discovery by Paul and Bunnell (1932) that the blood serum in glandular fever contains heterophile antibodies in the form of an agglutinin for sheep's red cells. Many forms of this disease, not previously recognized, have been identified with the help of this test. It has been found that certain other conditions may give a positive Paul-Bunnell test and the most notable of these is serum-sickness. Further studies by Stuart *et al.* (1934), Bailey and Raffel (1935), Davidsohn (1937), Barrett (1941) and Kilham and Steigman (1942) have shown that the normal heterophile antibody from the serum can be completely absorbed by the guinea-pig kidney, that that met in serum-disease can be absorbed by guinea-pig kidney and ox erythrocytes and that the heterophile antibody of glandular fever can be absorbed by ox corpuscles but not by guinea-pig kidney (table I). The absorption test is very useful when serum-sickness cannot be excluded as well as for identifying significant low titre reactions.

During the year 1944, a request from the medical officer of the Royal Naval Hospital in Bombay for performance of Paul-Bunnell test, on the sera of their patients, led the author to utilize this opportunity to carry out this piece of work. As these tests were rarely asked for by the medical profession in Bombay, and that has been the experience of the author for the last five years, such tests were not carried out at this Institute as a routine. Under the circumstances it was thought desirable to establish first the minimum diagnostic titre by estimating the level of sheep cell agglutinins in the sera of normal and healthy individuals from hospitals and private practitioners. Accordingly Paul-Bunnell tests were done on 300 random samples of sera received for Wassermann test. Three hundred samples of Widal sera were also done with a view to detecting if any cases of glandular fever were missed. The number of samples of sera specifically sent for the diagnosis of glandular fever were 64 out of which 53 were received from 44 cases in the Royal Naval Hospital.

Technique

Several methods of performing the Paul-Bunnell test are in vogue, the variations being confined mainly to the amount of serum used

and to the strength of sheep cell suspension. In all methods it is essential to inactivate the serum first by heating at 56°C. for 20 minutes and to use sheep cell suspension which is not less than 24 hours old and not older than 5 days. In addition, the work of Stuart, Burgess, Lawson and Wellman (1934) showed that there is no general agreement in the literature concerning sheep cell agglutination titres of normal people and that the titre depended on such factors as the temperature at which the test is performed, the concentration of the sheep cells employed and the expression of the titre in terms of final concentration of serum after the addition of sheep cells. Therefore, no statement of sheep cell agglutination titres is of value without information concerning the exact technique.

The technique adopted was as follows—A series of doubling dilution of the inactivated serum was made with saline starting with 1 in 5, with 0.5 c.c. of the diluted serum in each tube of an internal diameter of 9 mm. To each of these tubes was added an equal amount of 1 per cent suspension of sheep cells in physiological saline. The cells were thrice washed with the physiological saline and the hæmatocrit of a concentrated suspension was determined and the amount of saline necessary to give 1 per cent of suspension was added. The final serum dilution, after the addition of sheep cells, therefore, ranged from 1 in 10 to 1 in 2,560. The test rack was incubated at 37°C. for two hours and the results were read after shaking until all the sediment was evenly suspended. Three grades of agglutination were recognized, firstly, all the cells remaining in one solid clump, secondly, numerous small clumps easily visible to the naked eye, and thirdly, extremely fine clumps, invisible to the naked eye but visible only with the hand lens. Whenever the absorption test was indicated to determine the true nature of the antibodies present the Barrett's (1941) modified technique was followed using boiled and phenolized guinea-pig kidney and ox cell suspensions as the absorbing antigens. Table I below shows the variety of heterophile antibody and the means to detect that by the absorption technique :—

TABLE I

Variety of heterophile antibodies	Treated with	
	Ox cells	Guinea-pig kidney
'Normal' ..	Not absorbed	Absorbed
Serum-sickness ..	Absorbed	
Glandular fever ..	"	Not " absorbed

Results

Three hundred random samples of Wassermann sera and 300 samples of sera received for Widal tests were submitted to Paul-Bunnell tests with the technique above described. The results as

expressed in the final dilution of serum are summarized in the following table:—

TABLE II

Serum dilution	WR sera	Widal sera
10	22	3
20	2	0
40	1	0
80	1	1
160	0	1
TOTAL ..	26	5

Two out of 26 Wassermann sera showed a titre of 1 in 40 and 1 in 80. These two sera, when submitted to the absorption technique, showed that the antibodies did not belong to the glandular fever type. Since 24 out of 26 sera were negative in a dilution of 1 in 80 by Paul-Bunnell test, that dilution was taken as the minimum diagnostic titre for the diagnosis of glandular fever, while a titre of 1 in 40 was considered as suggestive of that condition, requiring either an absorption test or a repetition of the Paul-Bunnell test on a second sample. This information was essential in view of the paucity of published data concerning the distribution of heterophile agglutinins in normal population and few reports that are available refer to Paul and Bunnell (1932), Stuart *et al.* (1934), Davidsohn (1937) and Barrett (1941) who have stressed the need of a preliminary study of the normal population, in the absence of any uniformity of technique. Besides normal sera, 300 Widal sera were tested with a view to detecting if any cases of pyrexia due to this disease were missed. The two Widal sera that gave positive results in a dilution of 1 in 80 and 1 in 160

had a typical course of enteric-like infection with all laboratory findings repeatedly negative. It was difficult to account for these findings in these 2 cases but the absorption test on these sera proved that the agglutinins were not of the glandular fever type. Even in normal sera small amounts of an antibody, indistinguishable from glandular fever antibody, may exist. Barrett (1941) examined 300 normal sera and demonstrated this in 5 of them, establishing the fact thereby that mere presence in a patient's serum of a sheep cell agglutinin which is absorbed by ox cells but not by guinea-pig kidney does not provide proof that the patient is suffering from glandular fever.

The number of samples of sera specifically sent for the diagnosis of glandular fever was 64, out of which 53 were received from the Royal Naval Hospital in Bombay and the rest from different hospitals. Fifty-three samples were collected from 44 cases in the same hospital, out of which only 12 cases were clinically diagnosed as glandular fever. Out of these 12, only in 7 cases, the laboratory confirmation by way of Paul-Bunnell tests was obtained. In the remaining 5 cases, Paul-Bunnell tests, when repeatedly done, remained negative. The remaining 32 cases in which glandular fever was initially suspected were finally labelled on clinical grounds as dengue, infectious hepatitis, tonsillitis, pharyngitis, scrub typhus, PUO and NYD.

Observations on the diagnosis of glandular fever

This disease chiefly attacks young children and adults, male patients preponderating. In

TABLE III
Summary of the laboratory and clinical findings in seven cases of glandular fever

Case number	Sex and age	Day of fever	Sore throat	Enlarged glands	Rash	Total WBC per c.mm.	Monocyte differential count, per cent	Paul-Bunnell test titre
I	Male, 24	5th	Present	Present	Nil	16,000	76	1 in 80
II	Male, 19	7th	Present	Present	Nil	16,000	83	1 in 640
		15th	Absent	"	"	8,600	60	1 in 80
III	Female, 25	6th	Absent	Present	Nil	8,600	73	1 in 40
		10th	"	"	"	..	74	1 in 640
		12th	"	"	"	..	82	1 in 640
IV	Male, 18	6th	Present	Present	Present	12,500	37	Negative
		15th	Absent	"	Absent	7,300	56	1 in 160
		20th	"	Absent	"	12,900	54	..
		27th	"	"	"	11,300	61	Negative
V	Male, 19	4th	Present	Present	Present	6,800	50	1 in 160
		18th	Absent	"	Absent	..	38	1 in 80
VI	Male, 19	15th	Absent	Absent	Absent	19,800	82	1 in 160
		18th	..	..	..	..	..	1 in 160
VII	Male, 22	8th	Absent	Present	Absent	..	..	1 in 640

required further laboratory and clinical investigation. One of them was sent for sero-diagnosis of brucella infection by one of the hospitals. Later on a brucella organism was reported by blood culture from that case. The other case

the present series all the patients are adult males except one. In nearly all cases the history revealed some days of malaise before the onset of acute illness followed by a mild or severe sore throat. Faucial involvement was

present in 4 out of 7 patients and in all cases microscopic and bacteriological examination of throat swabs excluded infections with diphtheria, hæmolytic streptococci or organisms of Vincent's angina. The involvement of lymphatic glands was another characteristic feature in 6 out of 7 cases. The posterior cervical, axillary and inguinal glands were involved in turn and they were discrete, with a rubbery feel but not tender. The adenitis was accompanied by sharp pyrexia, the fever being irregular, ranging from 100°F. to 103°F. A fleeting erythematous rash was present in 2 out of 7 cases only. Paroxysmal cough and dysphagia when present indicated involvement of mediastinal group of glands. Slight enlargement of spleen was common. Jaundice occurred in 1 case only. All the patients made uneventful recoveries though one fatal case is recently recorded by Ziegler (1944). The blood changes are usually characteristic but they are transient. After a fleeting polymorphonuclear leukocytosis the count shows a characteristic increase in the number of mononuclear non-granular cells which vary from 40 to 90 per cent of the total leukocytes instead of the normal 20 per cent. The total leukocyte count is rarely more than 12,000 to 18,000. The red cells are not diminished in number. In this series, the number of mononuclear non-granular cells varied from 53 to 83 per cent while the leukocytosis was moderate varying from 8,000 to 20,000.

Discussion

Paul-Bunnell tests.—Paul and Bunnell examined 2,000 cases representing 76 clinical conditions including acute adenitis, tubercular, syphilitic adenitis and other diseases associated with glandular enlargement. In all these, either the reaction was negative or only feebly positive at a low titre. The heterophile antibody in the form of an agglutinin for sheep red cells is usually sufficiently strong to be diagnostic by the fourth day of the disease and it is present in high titre during the active phase. It may disappear within two weeks but is generally detectable in decreasing amounts for 4 to 5 months. Whatever may be the significance of the agglutinins for sheep erythrocytes, which are developed in the disease, demonstration of their presence in appreciable titre is still an essential factor in diagnosis. Attention is drawn to the following features:—

1. In cases seen by the 4th or 5th day, a diagnostic titre of agglutinins had already been reached (cases nos. 1 and 5).

2. Cases in which a titre of 1 in 40 or less on the 6th day of disease was noted showed a rise to 1 in 160 or more within 4 to 8 days (cases nos. 3 and 4). This showed the rapid rise which might occur and illustrates the necessity of repeated examinations for rise in titre but the fact that a rapid increase may occur in a short time probably renders this

observation invalid in the absence of serial daily determinations.

3. The titre once established may not last for a long time was shown in case no. 4. In the sample examined on 27th day of disease no agglutinins could be demonstrated.

4. The importance of the absorption tests with guinea-pig kidney extract and boiled ox erythrocyte suspension was well illustrated in cases nos. 1, 5 and 6, where the titres were not high or there were no opportunities of further examination of the samples. That the two sera in the Widal series did not possess any antibodies of the glandular fever type was proved by the absorption test alone. A reference has already been made to 5 cases of glandular fever diagnosed on clinical grounds but with repeated negative Paul-Bunnell tests. Cases of this type are on record where the heterophile agglutinins may be delayed as late as 10th week (Himsworth, 1940) or they may not develop at all throughout the course of the disease (Fuller, 1941). Shafar and Weir (1943) described an outbreak of glandular fever in Scotland affecting about 200 persons on which the Paul-Bunnell reaction was almost uniformly negative. Under these conditions it has to be stressed that a positive Paul-Bunnell test in the diagnostic titre and in the absence of serum-sickness confirms the diagnosis of glandular fever when taken in conjunction with the clinical findings, while a negative test does not necessarily exclude that condition. Low titre or border-line reactions require further confirmation by absorption tests.

Summary

1. To determine the level of heterophile antibodies in the local population 300 Wassermann sera were submitted to Paul-Bunnell tests, the technique of the test being fully described. The absorption test was carried out with Barrett's modification.

2. To find out if any cases of pyrexia due to glandular fever were missed, 300 Widal sera were similarly tested. Two of these sera were positive in a diagnostic titre of 1 in 80 or over but the absorption test showed that the antibodies were not of the glandular fever type.

3. Fifteen out of 64 sera, specifically received for the diagnosis of glandular fever, gave positive results with the Paul-Bunnell tests. They were derived from 7 cases; the laboratory and clinical findings of these are summarized.

4. The clinical diagnosis of glandular fever and the significance of positive and negative Paul-Bunnell test is discussed and the value of the absorption test in low titre reactions stressed.

My thanks are due to Surg. Capt. Vickery of the Royal Naval Hospital, Bombay, for permission to use clinical reports and to Surg. Lt. Allan and Surg. Lt. Pugh for their kind help.

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STUDIES OF RINGWORM*

Part IV

INCIDENCE OF *TRICHOPHYTON GYPSEUM* IN INDIA

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Trichophyton gypseum Bodin 1902 or any of its many variants has not been recorded in India as yet. It is the cause of the small-spored ectothrix trichophytosis in man. Being of animal origin it produces more inflammatory reactions than other ringworm fungi.

In children.—It causes the ringworm of the scalp (*Tinea capitis*) often producing the condition called the 'kerion' in which the affected patches are acutely inflamed and raised to a boggy swelling; the hair follicles are gaping wide and contain pus, the hairs become loose and easily come out.

In adults.—Besides causing ringworm of the scalp it affects the secondary sex hairs causing sycosis barbæ (*Tinea*) in the beard region and pustular folliculitis in the pubic region. It also affects the lanugo hair, the glabrous skin and the nails. Similar inflammatory reaction takes place when it affects the hair follicles of the beard and pubic regions and also the lanugo hairs. The affections of the glabrous skin and the nails resemble ordinary ringworm lesions.

Materials

The present observations are based on the following cases :—

A. Hair infection (ectothrix):

Beard and moustache	.. 2 cases
Generalized infection	.. 1 case
Scalp (kerion)	.. 1 case

Some samples of hair from cases of ringworm of the scalp in the Gurkha troops.

B. Skin infection :

Interdigital	.. 2 cases
Nail infection	.. 1 case

Method of Study

In all cases the fungus was first detected by microscopic examination of the hair, nails or scales from the lesions, and the species was then identified by cultural methods.

Microscopic examination. (a) *Hair.*—The hair from the scalp or beard areas showed infection with *Ectothrix trichophyton*. The spores were small about 3 microns in diameter situated outside the hair arranged in groups or in a linear way. The mycelia showed beaded appearance due to the formation of arthrospores (see figures 3 and 4, plate VI).

(b) *Scales and nails.*—In the skin and in the nails the fungus showed segmented mycelia with occasional branching.

Mycology

Primary culture.—Primary cultures were put up on Sabouraud's proof medium and on Sabouraud's proof medium containing gentian violet (1 : 400,000) to inhibit the growth of the pyogenic cocci.

In Sabouraud's media the growth appeared usually on the third day after inoculation. The character of the growth was granular, the centre was slightly brown or yellow in colour and the margin was white. The surface was powdery, yellowish brown in colour. The powder was coarse and more thinly spread at the periphery. After some days the centre was often raised forming a central boss with concentric ring formation at the periphery (see figure 5a, plate VI). Occasionally there were furrows radiating from the centre. The growth was fairly rapid and covered a surface area of 5 cm. in diameter in two weeks.

In the media containing gentian violet the appearance of the growth was delayed to the fourth or fifth day after inoculation and its further progress was necessarily slow.

Subcultures.—(a) Sabouraud's proof medium—the growth maintained its rapidity and reached 6 cm. in diameter in 2 weeks and about 10 cm. in 6 weeks. Two types of growth were observed : (i) granular and (ii) fluffy. The granular type was usually seen in recently isolated cultures (see figure 5b, plate VI) while the fluffy type was found in comparatively old cultures (see figure 5c, plate VI). In the granular type characteristic end organs were found in good numbers, while in the fluffy type the end organs were few and rudimentary in character. In some subcultures both the types of growth were often mixed up; some portion was granular and some portion fluffy or velvety.

(b) Sabouraud's medium of conservation—formation of a central crater in some cases.

(c) Glucose agar—character of growth was same as in Sabouraud's medium.

*Read at the Indian Science Congress held in January 1947 at Delhi.

(d) Cereals, wheat and barley—growth was brown and granular in character.

Reproductive forms (end organs)—wheat-starch water was used as a nutrient solution for the study of the end organs and hanging drop preparations were made with it in wetted slides.

(a) Macroconidia or fuseaux were found in abundance in a recently isolated granular culture. These were short, stumpy and clavate and varied in size from 40 to 50 microns \times 7 to 8 microns and contained 3 to 4 cells (see figure 6a, plate VI). (b) The aleuriospores of conidia were profuse, round and small in size from 2.5 to 2.8 microns in diameter and formed clusters known as grappes or thyrsi (see figure 6a, plate VI). (c) Chlamydospores of intercalary type were also present. (d) The spirals were few at first but their number increased with the age of the culture. These were coiled closely or loosely according to the moisture contents of the media, the coils loosening with the drying up of the media. The spirals were abundant round the spore clusters known as grappes or thyrsi and formed the 'sterile perithecia' of Langeron and Milochevitch (see figures 6a and 6b, plate VI).

Old cultures which were on the way to pleomorphic changes showed few fuseaux but clubbed-end mycelia and aleuriospores in groups were present.

Pleomorphism.—The pleomorphic changes were relatively quicker in this than in other trichophyta, taking about 6 weeks to show the changes on Sabouraud's proof medium. In Langeron and Milochevitch's cereal and starch-peptone media the pleomorphic changes were slower. On Sabouraud's proof media the changes started from the central boss which became white and covered with velvety down and gradually extended to the periphery. Sectorial pleomorphic forms were also noticed in some cases, in which some portion of the growth was granular and the rest downy. When completely pleomorphic the mycelia were sterile and did not contain any spores.

Animal inoculation.—A portion of the back of a guinea-pig was shaved and an emulsion of the fungus (from the granular type of growth) with normal saline was rubbed on the part. Evidence of infection was found on the tenth day and microscopic examination of the hair from the lesion gave positive result. The fungus could be easily recovered from the lesion. The experimental lesions were found to be extending gradually all around the original site (see figure 7, plate VI).

Repeated attempts failed to produce the lesions when guinea-pigs were inoculated with the downy pleomorphic growth—thus showing that pleomorphism is the degenerative form of the growth.

Clinical Types

The following clinical types were observed:—

1. Beard and moustache area—2 cases. In both the cases the infection was in patches with

intervening normal areas. The patches were raised, inflamed and painful. The affected hair follicles were pustular. In the textbooks moustache area is said to be affected rarely but in both the cases of this series the moustache areas were involved (see figure 1, plate VI).

2. Scalp—(a) Kerion condition in a child (see figure 2, plate VI).

(b) Ringworm of the scalp in Gurkha troops.

3. Generalized infection—1 case. Generalized infection of the hair causing pustular folliculitis in several small patches affecting the beard area, pubic region and both the upper and lower extremities. The patches were raised, inflamed and painful; the infected hairs were loose (not brittle) and the hair follicles contained pus.

4. Skin—Interdigital spaces in the hands simulating ringworm.

5. Nail—Similar to that of an ordinary ringworm infection.

Discussion

In the textbooks many variants of *T. gypsum* have been mentioned such as *T. asteroides*, *T. radiolatum*, *T. granulosum*, *T. lacticolor*, *T. farinulentum* and *T. persicolor*, etc. It is well known that *T. gypsum* is very unstable and undergoes pleomorphic changes soon after isolation. According to the degree of pleomorphism the character of the growth changes from granular to fluffy or velvety type and the number and character of the end organs also undergo changes. The characteristic fuseaux very soon disappear and are replaced by the clubbed-end mycelia which also disappear on further degeneration. The spirals change from closed to open wind according to the moisture content of the media. In the fully pleomorphic stage the growth is white, fluffy and the mycelia sterile bearing only a few rudimentary aleuriospores.

Based on the above findings it can be safely concluded that the many variants mentioned in the textbooks are but different forms of the same mother species in the various stages of its degeneration.

EXPLANATION OF PHOTOGRAPHS

Fig. 1.—A case of *Trichophyton gypsum* infection of the moustache and beard areas.

Fig. 2.—Kerion formation in a child of 5 years.

Fig. 3.—Hair from the moustache area showing small-spored ectothrix infection. Mag. \times 270 approximately.

Fig. 4.—Hair from the scalp showing early infection. Mag. \times 450 approximately.

Fig. 5.—(a) Primary cultures on Sabouraud's medium (granular growth with concentric rings).

(b) Subculture on Sabouraud's medium, 2 weeks old.

(c) A fluffy growth.

Fig. 6.—Culture on wetted slide showing—

(a) Typical end organs. Mag. \times 450 approximately.

(b) Spirals. Mag. \times 270 approximately.

Fig. 7.—Guinea-pig showing experimental infection of *T. gypsum*.

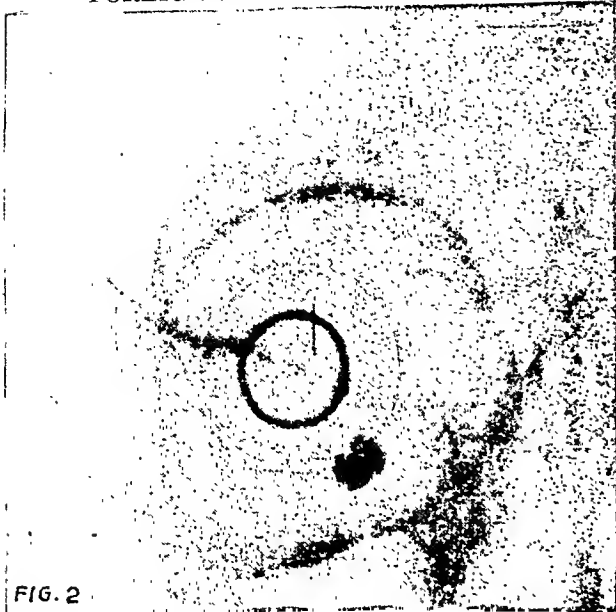


FIG. 2

ANTERO-POSTERIOR X-RAY PHOTOGRAPH
WITH GOOD CENTERING



FIG. 5

LATERAL X-RAY PHOTOGRAPH
WITH POOR CENTERING



FIG. 3

LATERAL X-RAY PHOTOGRAPH
WITH GOOD CENTERING

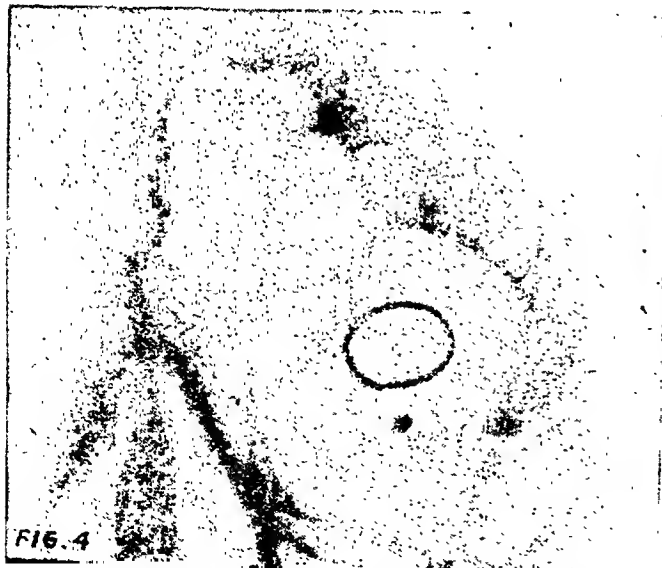


FIG. 4

ANTERO-POSTERIOR X-RAY PHOTOGRAPH
WITH POOR CENTERING

POST-MORTEM APPEARANCES IN TROPICAL
EOSINOPHILIA : R. VISWANATHAN. (O. A.)
PAGE 49

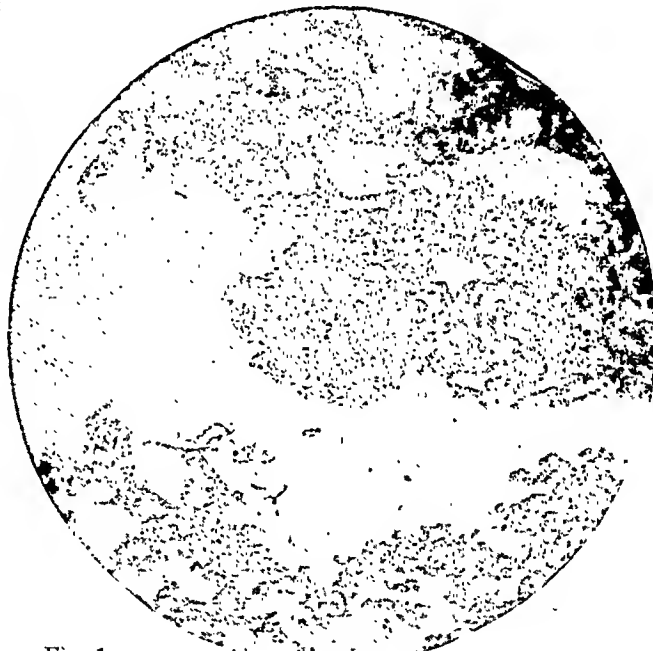


Fig. 1.

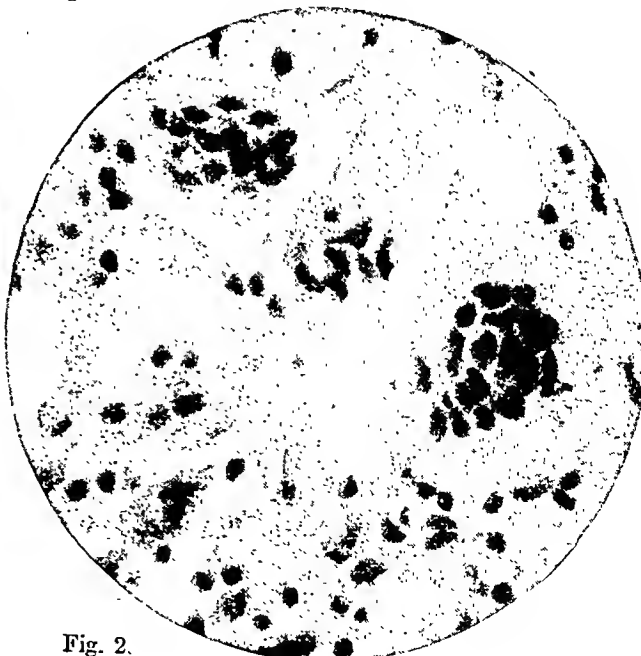


Fig. 2.

Fig. 1.



Fig. 2.

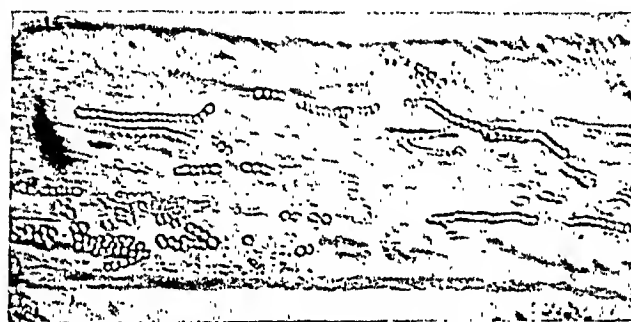
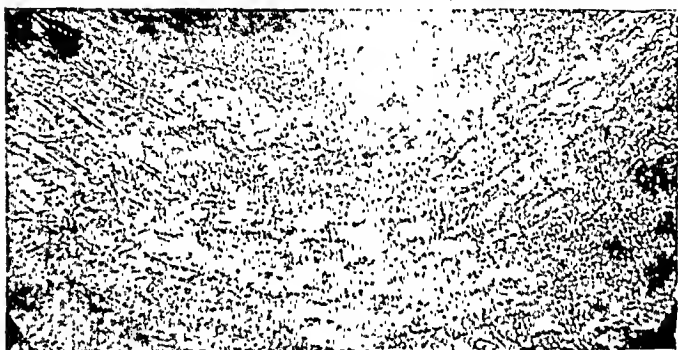
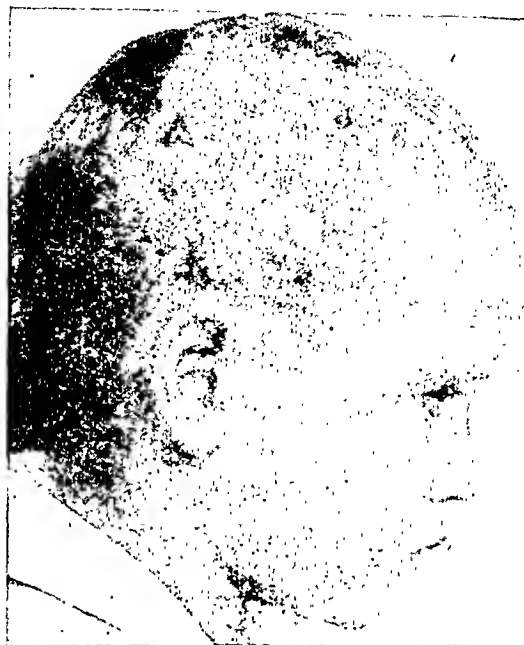


Fig. 3

Fig. 4



Fig. 5.



Fig. 5b.



Fig. 6a.



Fig. 6b.

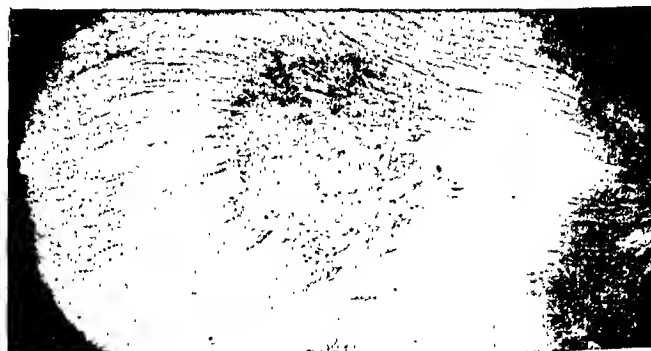


Fig. 7.

It is proposed therefore to include all the variants mentioned into one species *T. gypsum* Bodin 1902.

Summary

1. Incidence of *Trichophyton gypsum* is recorded for the first time in India.

2. The fungus was isolated from the hair, skin and nails.

3. In all the cases the recently isolated culture had the same character of growth and produced the same end organs.

4. As the culture grew old, various pleomorphic or degenerative changes occurred and

with the degree of pleomorphism the character of the growth changed from granular to fluffy or velvety type.

5. The number and character of the end organs changed with the degree of pleomorphism resembling one of the many variants mentioned in the textbooks.

6. It is proposed to include all the variants into the mother species *T. gypsum* Bodin 1902.

Acknowledgment

We express our grateful thanks to Major C. D. Calnan, R.A.M.C., who sent us some samples of hair from cases of ringworm of the scalp in the Gurkha troops for identification.

A Mirror of Hospital Practice

A CASE OF TRAUMATIC IRIDODIALYSIS TREATED BY OPERATION

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THE opportunity of operating upon a case of extensive iridodialysis rarely presents itself and it is therefore thought that a report on a case may be of interest. The iridodialysis in most cases is too small to require surgical repair but a larger one may give rise to diplopia and diminished vision. The operation may also be performed for cosmetic reasons.

Spaeth (1939) describes the operation and various modifications by Key (1932), Jameson (1909), and Wheeler (1934).

Case report

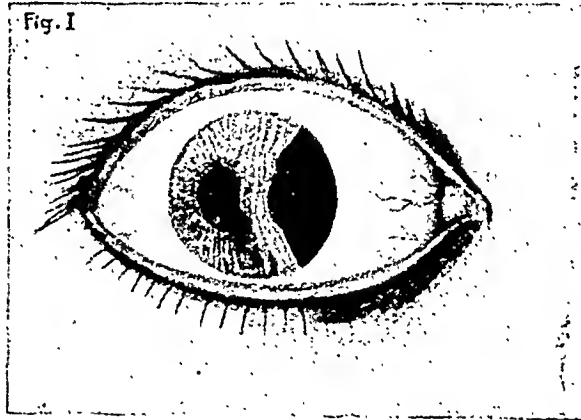
P. R., age 34, male, while repairing a telephone pole, was suddenly struck in the left eye by one of the wire supports. The wire had a diameter of about $\frac{1}{2}$ inch and it was the side of the wire, not the sharp end which struck him. He was treated in the local hospital and about three weeks later was admitted to the Eye Infirmary, Medical College Hospital, Calcutta.

On examination.—Left vision = 6/24. There was no congestion and the eye was quiet. Cornea normal. Anterior chamber deep. The pupil was irregular but there were no synechia or K.P. A large iridodialysis from 1 o'clock to 5 o'clock was seen (see figure 1). Some traumatic lens opacity was apparent. Tension was normal. Vitreous and retina appeared normal.

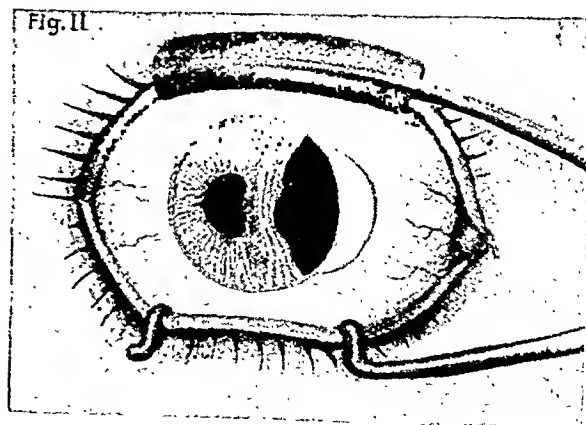
Right eye vision = 6/6 normal.

Operation.—On 18th March, 1945, the eye was cocaineized and the upper division of the

facial nerve was infiltrated with novocaine 2 per cent. A small conjunctival flap was dissected

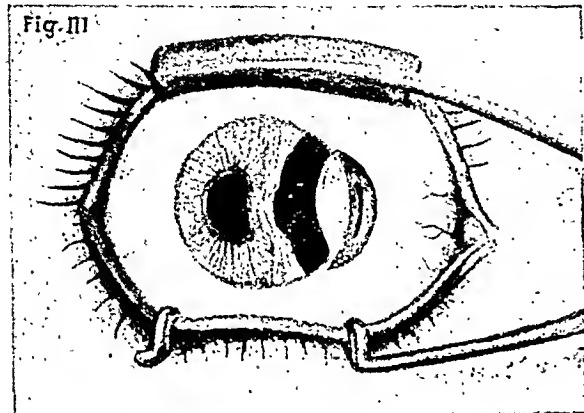


up from 2 to 4 o'clock (see figure 2). A keratome incision was made at 3 o'clock in the



selera about 1.5 mm. from the apparent limbus (see figure 3). Iris forceps were introduced and the lower half of the peripheral border of the

iris dialysis was grasped and gently pulled into the lips of the wound (see figure 4). The upper half of the peripheral border of the dialysis was



then treated in a similar manner. This resulted in the complete reposition of the iris except for a very small 'button hole' at 1 o'clock (see

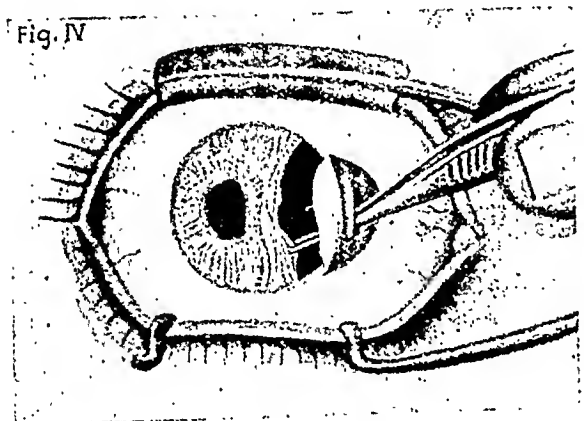
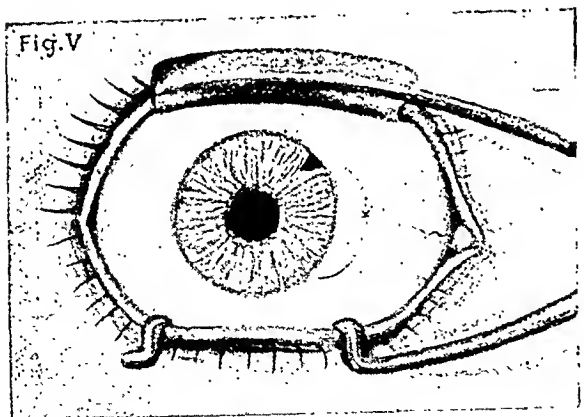


figure 5) which was left as complete reposition would have necessitated extension of the incision upwards. The iris was drawn into the wound



so that its edge was included in the lips of the wound but not so far as to prolapse through the wound. The conjunctival flap was sutured with

one stitch and one drop of guttae atropine sulphate 1 per cent instilled.

Progress was uneventful; the eye healed rapidly and was white in 8 days. The tension remained normal. Subsequently the pupil was seen to be slightly dilated and only reacted to light on the nasal side. Vision improved to 6/18.

Comment

The operation proved to be very easy and no reaction was observed. No iris stitch was found to be necessary, the edge of the iris adhering between the lips of the keratome incision most satisfactorily. It would seem that stitching the iris to the sclera is not desirable as the risk of iritis would be much greater.

Summary

A case of traumatic iridodialysis and its operative repair is described.

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A PRESUMPTIVE CASE OF ERYTHRO-BLASTOSIS FOETALIS DUE TO Rh INCOMPATIBILITY

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ON 9th December, 1946, two samples of blood, (i) in citrated saline and (ii) in a dry tube from a mother who had given birth to a baby three days before, the baby developing jaundice on the second day of life, were received from Eden Hospital, Calcutta. Neither the baby's blood nor the father's blood was received.

Serological findings.—The mother was a subject B and Rh— (by animal and human sera).

The mother's serum agglutinated red blood cells (rbc hereafter) of 10 Rh positive group B and 7 Rh positive group O subjects so far tested

but failed to agglutinate the rbc of a Rh— group B subject. The tests were performed both on slides and in test tubes. Hæmagglutination appeared rather late (in about 45 minutes) on slide but was not poor. The reaction in the tube in 1 hour was satisfactory. The titre was low. The hæmagglutination improved on increasing the quantity of serum.

The mother's serum contained both the anti-Rho and anti-Rh' bodies. As known Rh" rbc were not available at the time the presence or absence of anti-Rh" body could not be determined. The serum may be called anti-Rho' or anti-Rh₁.

The mother.—Mrs. P. R. V., Parsee, aged 34 years, married 3 years, twice pregnant. No history of blood transfusion. Wassermann reaction negative.

First child, premature (8th month), died on the 4th day with jaundice (probably not caused by Rh incompatibility).

Second child, present baby.

The baby.—Full term. Jaundice noticed on the 2nd day, deepened and killed the baby on the 5th day.

Blood from the baby never became available for testing. That a baby is born apparently normal and develops jaundice later is known and appears to be the usual sequence of events. During intra-uterine life the mother disposes of the products of destruction of rbc of the fetus. They accumulate after birth only (Hallwright, 1946).

The family.—Contact with the father could not be made. As there is no child alive the parents are anxious to save the next baby. The mother has been told that (i) a baby not subject to the disease is possible and that (ii) attempts can be made to save the next baby by making arrangements for blood transfusion, etc., in advance. An account of the arrangement has been given previously (Greval, Roy Chowdhury and Banerji, 1946b). A slightly different plan has been given recently (Cappell, 1946). According to this plan (i) the serum from the mother is examined monthly, after the 6th month of pregnancy, for the rising titre of the anti-Rh bodies, (ii) Caesarean section is considered when the father is homozygous Rh positive, and (iii) the colour of the umbilical cord and of the plasma of the cord blood is examined immediately on birth and if found icteric (in an Rh+ baby) a blood transfusion (of a suitable blood) is given without waiting for the appearance of the clinical symptoms of erythroblastosis foetalis.

Presumption of sensitization of a mother.—Even without the use of an anti-Rh serum (human or animal) the presumption of sensitization of a mother arises when her serum gives anomalous group reactions. Such reactions given by the sera of pregnant women and quite unconnected with Rh, however, are known (Dockeray and Sachs, 1944). The writers

recently reported the case of an expectant mother O whose serum agglutinated 41 samples of rbc O, including 2 ORh— samples. Although she was Rh— the anomalous intra-group reaction was not due to an anti-Rh agglutinin (Greval, Roy Chowdhury and Banerji, 1946a). In the present case, however, the mother's serum contained an anti-Rh body.

The case remains presumptive inasmuch as the child's blood was not available.

This is the second case of presumptive erythroblastosis reported by the writers. The first case was reported last year (Greval, Roy Chowdhury and Banerji, *loc. cit.*). So far 2 cases have been detected in less than 12 months.

The serum is not suitable as a testing serum. Its titre is low. Conglutination does not raise the titre.

The writers are indebted to Major G. B. W. Fisher, I.M.S., and Dr. Miss A. Sen for sending the blood.

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Therapeutic Notes

NOTES ON SOME REMEDIES

VI. SULPHONAMIDES

II

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General considerations

Good and sometimes spectacular results with sulphonamides are obtained usually in the acute infections, but in the main these drugs do little good in chronic conditions. For example, in acute gonorrhoea this therapy works wonders in 4 or 5 days, whereas in chronic gonorrhoeal arthritis little or no response can be expected. Best results are obtained if they are given early when the infecting organisms are still small in number: in pneumonia, specially, treatment should be begun before the development of the classical signs. Under-dosage is still far too frequent; if there is a real indication, they

should be used boldly in adequate amount without the physician's mind being fixed on the rare event of agranulocytosis. On the other hand they are not to be given indiscriminately in every low grade infection which heals up spontaneously. The importance of rapid raising of blood concentration has already been stressed. In severe infections this should be ascertained during the first two or three days or even earlier if possible; this may go far to explain failure and to suggest the next move in therapy. Likewise, the course of diseases like meningitis and septicæmia is best controlled by bacteriological examination. But if such examinations are not possible the drugs can still be used with reasonable safety and success, provided that the instructions here outlined are applied with common sense. In this connection it should be noted that the sulphonamides can inhibit bacterial growth in pathological fluids, so in sending a specimen, the bacteriologist should be informed that the patient is receiving these drugs, so that he may use the special culture medium required. Relapses can be treated with renewal of the drugs, but before doing so a white blood cell count should be made.

Ancillary treatment is as important as in any other therapy. Sulphonamides may not be a substitute for surgery and operative treatment should never be unduly delayed because they have been used. Virus infections, with the possible exceptions of trachoma and lymphogranuloma inguinale, do not respond to these drugs, but there is evidence that they have a definite place in the treatment of secondary bacterial conditions. Finally, there are no special contraindications to their use except severe hepatitis and advanced renal disease, especially with nitrogen retention. Some caution is required in pregnant and lactating women as these drugs are slightly excreted in milk and they pass through the placenta into the foetal circulation, though they need not be withheld for that reason. Racial susceptibility is worth remembering.

Therapeutic uses

In this section only some of the essential points are given and it has not been possible to give greater details within the limited space.

1. *Hæmolytic streptococcal infections*, e.g. cellulitis, erysipelas, septicæmia, etc.

In *septicæmia* sulphanilamide is very effective. If the response is not satisfactory, small blood transfusions (200 to 300 c.c.) are indicated. Any septic focus will require adequate treatment, but abscesses should not be incised until fully ripened, and care must be taken not to open up fresh channels of infection. Excellent results have been obtained in *erysipelas*; the spread of the lesion is stopped in 48 hours and the fever subsides in 3 to 4 days. Treatment should be continued with reduced dosage for a further period of seven days to prevent relapse. In *puerperal sepsis* sulphonamides have greatly reduced the mortality, the best results being

obtained with high blood concentrations. Quick relief follows in *acute otitis media* and *mastoiditis* both of which should be treated as severe infections, but the symptoms are liable to be masked and careful watch must be kept on the drum-head and mastoid bone as surgical intervention may be necessary. Treatment should be continued for a week to prevent relapse. If purulent discharge sets in, the infection rapidly becomes a mixed one of streptococci and staphylococci, when sulphathiazole or sulphadiazine should be preferred. Careful local treatment is necessary.

The great majority of non-hæmolytic streptococci are insensitive to sulphonamides.

2. *Staphylococcal infections*.—In severe cases sulphonamides should not be relied on if penicillin is available, particularly in acute osteomyelitis, cavernous sinus thrombosis, severe carbuncle, septicæmia and staphylococcal pneumonia and meningitis. In its absence sulphathiazole is the drug of choice. *Septicæmia* due to this cause is a serious condition with a high mortality. Give maximal or still higher dosage, even at the risk of toxic reactions. To avoid relapse or recrudescence, treatment should not be interrupted unless a pronounced clinical improvement or a dangerous toxic reaction occurs. The minimal dose should be 12 to 18 gm. a day (2 or 3 tablets two hourly) for three days, followed by 2 gm. four hourly for a further four days. If necessary the treatment should be continued for a longer period. Blood cultures are helpful as a guide to dosage and the length of the course. A colony of 20 or over per c.c.m. is a bad prognostic sign. A co-existing focal lesion such as abscess or osteomyelitis is of good omen. Small repeated blood transfusions are of great value.

Both in streptococcal and staphylococcal septicæmia full doses of sulphonamide and penicillin would seem the most promising combination, since some strains of streptococcus and staphylococcus are resistant to one or other of the drugs.

Sulphathiazole given early in *acute osteomyelitis* not only controls the systemic infection but also limits the bone infection, but it has to be combined with surgery when there is already bone damage and abscess formation. Treatment should not be stopped after the first few days when the disease may appear to be under control. The affected part should be immobilized. The cause of death is usually staphylococcal septicæmia and the patient should be treated as a case of severe infection. In *impetigo contagiosa* the drug is applied as a 5 per cent cream or paste twice in the day and night after removing the crusts and scabs. The condition gets almost cured in 5 or 6 days, but quicker results have been reported with 15 per cent suspension of microcrystalline sulphathiazole. Treatment should not be continued longer than 5 days, as patients are liable to develop hypersensitivity.

3. *Meningococcal infections* (cerebrospinal fever).—Chemotherapy has greatly reduced the mortality from this disease. It is vital to secure adequate blood concentration at the earliest possible moment and to maintain it for several days. Another point that is likely to be overlooked is the need for giving sufficient fluid to comatose patients. The initial dose or doses, except in mild cases, should be given intravenously as soon as lumbar puncture has shown the fluid to be turbid and without waiting for bacteriological examination. The fluid may not always be purulent, but the presence of even one or two polymorphonuclear cells should arouse suspicion. The dosage is higher than usual, no infant should be given less than 3 gm. daily during the first two days of treatment, for adults during this period 12 gm. daily is an appropriate dose and for children an intermediate amount. Intravenous (or intramuscular) injections may have to be repeated if the clinical condition does not improve within 2 or 3 days. When repeating lumbar puncture only a small quantity of fluid should be removed (5 c.c.) to prevent loss of sulphonamide. With clinical improvement the dose is reduced but the drug should be continued for about 10 days.

Meningitis due to *pneumococci*, *staphylococci* and *H. influenzae*, etc., is relatively resistant to sulphonamide treatment. In most cases the infection is secondary to a primary focus elsewhere in the body such as pneumonia, otitis and sinusitis. Examination of the spinal fluid should be made at frequent intervals so that relapse which is much more common in these infections may be detected at the earliest stage and appropriately treated with renewal of high dosage. The drug should be continued for at least a week after the temperature has subsided and for a longer period in *H. influenzae* infection which is specially liable to relapse. Remarkably good results have been obtained by combined sulphonamide and penicillin therapy in pneumococcal meningitis in which the case mortality before the advent of chemotherapy was a little short of 100 per cent. The same combination should be adopted for all these types of meningitis, although *H. influenzae* are relatively more resistant to penicillin.

4. *Pneumonia*.—In pneumococcal infection temperature usually comes down within 48 hours, but the treatment should be continued for 5 days more. Resolution occurs rather slowly and physical signs may persist for as long as a fortnight, but the drugs should not be given longer than 7 days. Age is an important factor in prognosis, and in the aged sulphonamides are not nearly so effective as earlier in life. Parenteral injections should be given in severely toxic patients or where the clinical response is poor. In some cases the drug has no effect when penicillin is indicated.

Adjuvants like oxygen, good nursing, etc., must not be forgotten.

In an average case of pneumonia, there is little to choose between the sulphonamides and penicillin so far as the end result is concerned, but there is a small percentage of patients over 40 for whom penicillin represents a definite advance on the sulphonamides. Generally the indications for its use are extensive pulmonary involvement, severe cyanosis and dyspnoea, heavy bacteraemia and lack of leucocytosis.

Pneumonia due to *streptococcus* or *Friedlander's bacillus* responds well to sulphonamides, although not so dramatically as in the pneumococcal disease. In *staphylococcal* pneumonia which is a very fatal disease penicillin is the drug of choice. *Bronchopneumonia* is caused by a wide variety of agents, against some of which sulphonamides may fail, but the difference in response seems to be more apparent at the extremes of life when the resistance to infection is poor. They are of value in *influenzal* pneumonia, provided the viral infection itself is not too severe; a leucocytosis favours the chance of a good response.

5. *Intestinal infections*.—Sulphonamide therapy has been strikingly successful in *bacillary dysentery*. In severe *Shiga* infections, the clinical response to sulphaguanidine is remarkable—abdominal pain and tenesmus are relieved in 1 to 2 days and the number of stools reduced to normal in a few days. Blood rapidly disappears although mucus persists for some time. Doses of 3 gm. four times a day for three days and then two or three times a day for four days are effective in all but the most severe infections in which the unit dose may be increased to 5 gm. Best results are obtained if treatment is started in 24 to 36 hours of the onset. In fulminating cases 50,000 to 100,000 units of concentrated anti-dysenteric serum (*Shiga*) should be given intravenously to combat the toxæmia. *Flexner* infections also respond very well, doses of 3 gm. being usually sufficient. Convalescent carriers are common among untreated patients, and these together with symptomless carriers can usually be cured by a course of sulphaguanidine. *Sonne* dysentery is rather resistant but it is a mild infection and the treatment is that of a convalescent carrier. Succinyl sulphathiazole (sulphasuccinyl) is reported to be equally effective and may be given in daily 10 gm. dosage, divided into five doses, but there has not been enough experience with it owing to short supply.

Although sulphaguanidine as a rule produces no toxic complications, large doses such as 24 gm. a day as originally used may result in high concentration in the body and if the drug is continued for more than 8 days, toxic symptoms become common. Succinyl sulphathiazole on the other hand is so poorly absorbed that it seems to be free from this danger.

These two drugs have been introduced on the hypothesis that, being poorly absorbed, they produce a higher concentration in the faeces and

hence are more effective than drugs which are well absorbed. If this hypothesis is correct, then succinyl sulphathiazole should be the best drug, but so far this has not been the case. Paulley (1942) suggested that it is not the concentration of the drug in the intestinal contents but the concentration in the blood which is the important factor. It is argued that bacillary dysentery is a systemic disease with focal intestinal manifestations and treatment should be more effective when the absorbable drugs such as sulphadiazine or sulphathiazole are used. This seems to be borne out by the fact that these drugs have given as good, or even better results, presumably because, besides having some local action, they are in a better position to act on the organisms lying in the mucosa. Reports are however conflicting and, according to our present knowledge, the following recommendations may be made. In severe cases sulphaguanidine should be given; in the dosage now employed it hardly ever has unpleasant side-effects and it is not advisable to give drugs which are toxic and easily liable to crystallize out in the urine of a dehydrated patient with oliguria. But as it is rather slowly absorbed it may be preceded by sulphathiazole during the first 24 hours. In other types of the disease, both forms of sulphonamides can be used, the dose of sulphadiazine or sulphathiazole being 2 to 4 gm. followed by 1 gm. 4 hourly, and later 6 hourly. All these drugs are not infallible and a change of drug in unresponsive cases may be an advantage. There is also some evidence that a combination of the two forms of drugs may be more desirable than either type alone in the acute phase of the disease. Succinyl sulphathiazole should be reserved for the treatment of Sonne dysentery and dysentery carriers who become bacteriologically negative after a course of 10 gm. a day for 5 days. It is also used in the pre- and post-operative stage of intestinal surgery owing to its marked property of reducing *B. coli* in the bowel—a property which is more noticeable with phthalyl sulphathiazole.

A few practical points may here be mentioned. Purgatives, high enemas and colon irrigations are contra-indicated. Fluid intake must be sufficient and, if necessary, glucose and saline injections are given intravenously. Sulphonamides should not be started in a dehydrated patient until steps have been taken towards restoration and maintenance of normal hydration. Lastly it should be noted that the dramatic relief of symptoms does not imply healing of the intestinal lesions; this usually takes some time and the convalescence should not be hurried, or there may be relapse. If possible, sigmoidoscopy and stool cultures should be made before a patient is declared as cured.

In *chronic bacillary dysentery and ulcerative colitis* reports are as yet inconclusive. In a few moderately ill patients sulphaguanidine has given complete remission of symptoms but

severe infections are unaffected. Full doses should be given, and it is often necessary to repeat the course. Where oral therapy fails, the use of retention enemas has been advocated, containing 7 to 10 gm. of sulphaguanidine or succinyl sulphathiazole in 7 ounces of water or mucilage. Such enemas can be retained from 6 to 8 hours, and to assist this, phenobarbitone or morphine is given as a bowel sedative.

Penicillin and sulphasuccinyl have given very promising results in *chronic amoebic dysentery* which has resisted the usual courses of treatment. An initial dose of 100,000 units of penicillin intramuscularly is given, followed by 33,000 units every three hours until two million units have been given. At the same time sulphasuccinyl is given until a total of 80 gm. has been taken. This course does not eradicate the amoebic infection but can deal with the secondary pyogenic organisms that invade the ulcers in the intestine and thus bring about conditions that permit a favourable response to anti-amoebic drugs. In the absence of sulphasuccinyl, sulphaguanidine may be used.

Sulphonamide therapy is also of value in non-specific colitis and in some cases of sprue along with liver injections or folic acid therapy. Chaudhuri and Rai Chaudhuri (1944) found sulphaguanidine very efficacious in controlling the diarrhoea.

In *cholera*, sulphaguanidine has already given favourable results, but trials are still continuing. Huang (1944) obtained rapid amelioration of symptoms with an initial dose of 3 gm. followed by 1 gm. every two hours for six hours and then 1 gm. four hourly for 1 to 2 days. In India the report of the Scientific Advisory Board (1945) records good results with a different method of treatment; sulphaguanidine was given in 3 gm. doses every four hours for 3 days, and then twice a day for 3 days. Such results are not obtained when treatment is started late. In any case usual steps should be taken to combat the dehydration and depletion of salts and colloids.

Finally it should be remembered that certain intestinal organisms synthesize vitamins and that sulphaguanidine and succinyl sulphathiazole given over long periods can reduce the natural flora of the bowel and thus inhibit the synthesis of many factors essential to the host, e.g. thiamine, members of B₂-complex such as folic acid, riboflavin, nicotinic acid, etc. Further a severe intestinal infection such as bacillary dysentery may in itself precipitate a deficiency state. It is therefore wise to attend to the vitamin B state of the patient when employing 'chemotherapy within the bowel'.

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[To be concluded]

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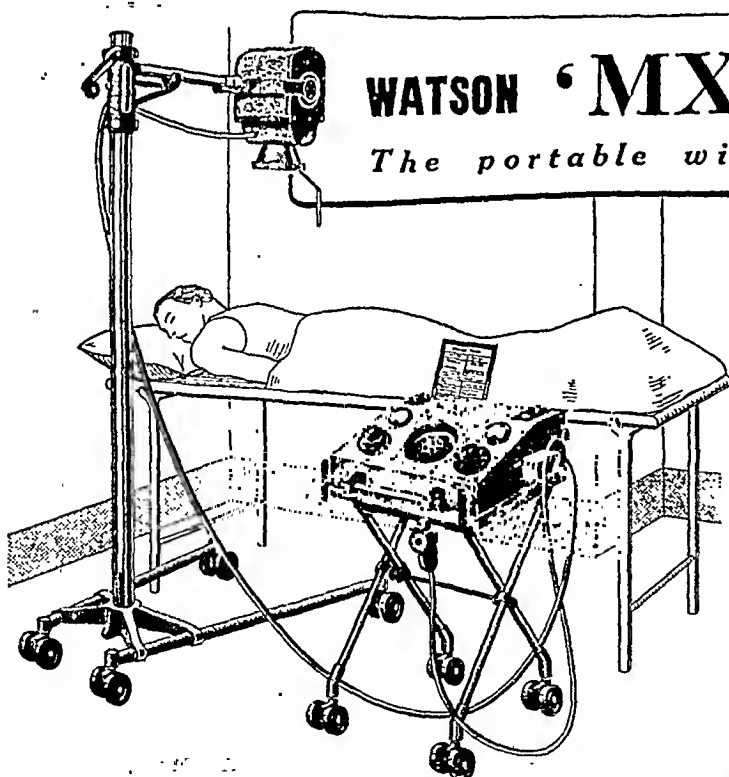
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Indian Medical Gazette

FEBRUARY

Rh BLOOD TYPES AND Hr

NOTHING in the immunological constitution of human red blood cells has grown so luxuriantly in such a short time as the details of the Rh antigens (Rh 'factor', a hæmagglutinin, an antigen contained in the red blood cells). Six years ago there was one *antigen*, Rh, and two *characters*, (i) Rh positive, Rh, dominant and (ii) Rh negative, rh, recessive. To-day there are three antigens and eight types. In addition, there is the Hr antigen (Hr 'factor').

The use of the indeterminate term 'factor' for the definite terms 'antigen' (in immunology) and 'character' (in genetics) has not contributed to the comprehensibility of the situation.

Another difficulty is the departure from the usual method of describing the basis of characters in genetics: The genes carrying the characters are composite, not single. One, two or three antigens (physical bases of characters) may occur together at the locus of a gene on the chromosome and are inherited together by the offspring.

Yet another difficulty arises in grasping the fact that the recessive character, responsible for the Rh negative state, is not really non-existent somatically as the character t (d would be better) is non-existent *vis-à-vis* T, in the genetics of the edible pea in Mendelism. With appropriate reagents both Rh and rh can be detected (Cappell, 1946).

What applies to the negative character rh applies to the positive characters with greater justification: No character in the genetics of Rh is recessive.

Once these difficulties are recognized and thus overcome the combinations of the antigens responsible for the types, as given in the scheme of the discoverer of the Rh antigen, are easy to follow. Additions made to the scheme by other workers are not necessary.

Rh types made easy.—The antigens are only three in number (Wiener, 1946a): Rh₀, Rh' and Rh". They occur singly or in combination thus:

	Antigen 1	Antigen 2	Antigen 3	Type as named
I	Rh ₀			rh ₀
II	Rh ₀	Rh'		Rh ₁
III	Rh ₀		Rh"	Rh ₂
IV	Rh ₀	Rh'	Rh"	Rh ₁ Rh ₂
V	..	Rh'		Rh'
VI	..		Rh"	Rh"
VII	..	Rh'	Rh"	Rh'Rh"
VIII	..	..	..	rh (Rh negative)

The types are the allelic genes, simple or composite.

Some of the types are common, others rare.

All the types can be determined by three antisera: Anti-Rh₀, Anti-Rh' and Anti-Rh".

It will be seen that four of the types contain the antigen Rh₀ while only one of them is known as the type rh₀ (originally described as Rh₀ and now again changed into Rh₀, *vide infra*).

It will also be seen that four types are without the antigen Rh₀.

Very recently their describer (Wiener, 1946c) has renamed four types thus:

Type	rh ₀	is to be	Rh ₀
"	Rh'	"	rh'
"	Rh"	"	rh"
"	Rh'Rh"	"	rh'rh"

Moreover, all types denoted by small r (rh, rh', rh" and rh'rh") are to be called Rh negative.

The eight types now are:

Rh ₀	{	Rh positive	
Rh ₁		(They are detected as positive, without differentiation between the antigens, by an animal testing serum. They contain Rh ₀ .)	
Rh ₂			
Rh ₁ Rh ₂			
rh'	{	Rh negative	
rh"		(They are detected as negative, without differentiation between the antigens, by an animal testing serum. They do not contain Rh ₀ .)	
rh'rh"			
rh			

A recipient falling under any of the four negative types cannot be transfused with blood from a donor falling under the positive types, because of the antigen Rh₀. All such recipients should be transfused from a strictly Rh negative donor of the type rh.

The possibility of the antigens rh' and rh" sensitizing recipients not possessing them remains, although clinically only the antigen Rh₀ appears to be potent in this respect.

Hr made easy.—This antigen has been responsible for considerable confusion because of the same letters in its symbol. For the present it will be sufficient to assume that it is an antigen (a hæmagglutinin) like A, B or M, N, but unlike them, is linked to certain Rh types. It occurs only in four types: (i) rh, (ii) rh", (iii) Rh₀ and (iv) Rh₂ (Hallwright, 1946). The other four types are free from it and are therefore Hr negative.

The Hr positive type is detected by an anti-Hr serum obtained from an Rh positive mother who has given birth to a baby suffering from erythroblastosis foetalis.

Of Hr also three types are possible: Hr₀, Hr' and Hr" (Wiener, 1946a).

The St serum may be considered synonymous with anti-Hr serum.

The incompatibility of an Hr positive donor for an Hr negative recipient has not yet been

commented upon. Evidently such an incompatibility exists and provides the important anti-Hr serum. The use of a donor of the type rh as a universal donor, therefore, cannot be safe.

CDE system.—This is Fisher's system which postulates 3 characters in a composite gene at a locus (quoted by Race, 1946). It includes both Rh and Hr characters. A comparison with Wiener's system and reactions of the antigens concerned are given below.

The brackets in the last two columns include the reactions Fisher has predicted (Wiener, 1946b).

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Designations of antisera

Fisher Wiener		Γ Rh'	II Rh''	Δ Rh ₀	γ Hr'Hr	η (Hr'')	δ (Hr ₀)
Genes							
Wiener	Fisher						
rh	cde	—	—	—	+	(+)	(+)
Rh'	Cde	+	—	—	—	(+)	(+)
Rh''	cdE	—	+	—	+	(—)	(+)
Rh ₀	cDe	—	—	+	+	(+)	(—)
Rh ₁	CDe	+	—	+	—	(+)	(—)
Rh ₂	cDE	—	+	+	+	(—)	(—)
Rh' (Rh'Rh'')	CdE	+	+	—	—	(—)	(+)
Rh ₁ (Rh,Rh ₂)	CDE	+	+	+	—	(—)	(—)

It will be seen that C, D and E correspond to Rh', Rh₀ and Rh'' respectively. The small letters are the alleles of the capital letters (not the hæmagglutinins, unlike the scheme of representation in blood groups).

One serious objection to the CDE system is that in it are introduced many letters and symbols but none of them has any relation to the symbol Rh.

The complexity of the Rh system is not necessarily of a higher order than that of ABO and MN systems. Had the system remained in the hands of serologists or biologists it would have settled down like the other systems which have their subdivisions and their anomalous reactions. Mathematicians into whose hands it has fallen intend imparting to it the mathematical precision. Such an accomplishment, however, is not possible in biology which is based on variation and defies precision attained through mathematical subtleties.

Types or subtypes?—Both terms are in use. Type would be preferable, in conformity with M and N types. One determines the Rh +/— state and then the type of the state (Rh₀, Rh₁, Rh₂ and Rh₁Rh₂ for the positive state and rh, rh' and rh'' for the negative state).

VENEREAL DISEASES NUMBER

(Reprinted from November 1946 issue of *I.M.G.*, p. 483)

It is proposed to publish a special number, in October next year, on venereal diseases in India. Original and special articles on their diagnosis, prevalence, complications and treatment will be welcome.

Contributions will be received up to July 1947 and placed before a special editorial committee.

It has been established gradually during the last 10 years or so that the venereal diseases do not thrive in India. Serious doubts have been cast on the previous estimates according to which 20 per cent of the population not showing any signs of syphilis consisted of latent cases of the disease. Such a state of things in India is impossible for a variety of reasons (*vide* this journal, vol. 81, 1946, nos. 6-7, p. 253). Contributions running counter to the old estimates need not therefore be held back in diffidence any longer.

Venereal diseases other than syphilis and gonorrhœa, some of them of special tropical interest, are very seldom discussed in the current medical literature in India. Recently they have been commented upon in this journal (vol. 81, 1946, no. 9, p. 365).

Medical News

TUBERCULOSIS HEALTH VISITORS' CLASS OPENED AT DELHI

'The Health Visitor is considered as the front-rank soldier in the war against tuberculosis. In relation to the clinic the health visitor is, or should be, its eyes and ears', observed Lieut.-General R. Hay, Chairman, Tuberculosis Association of India, opening the class of Tuberculosis Health Visitors in New Delhi Tuberculosis Clinic this morning.

He added: 'We all know the terrible nature and potentialities for havoc of this scourge—tuberculosis—which has been classed as India's public enemy No. 2. The figures available regarding morbidity and mortality reveal that tuberculosis takes a toll of half a million lives in India every year'.

It is estimated that India should have one clinic to every 50,000 urban population and one for every 100,000 rural population, making a total of 4,600 clinics. With a minimum of two health visitors per clinic 9,200 visitors would be required for tuberculosis work in the country. As against this minimum need India to-day has only a little more than 100 clinics and 100 health visitors.

Enumerating some of the duties of the health visitors, Lieut.-General Hay said that they have to visit the patients' home, look after their comfort and give the necessary instructions to the patients and their relatives regarding treatment. They have also to conduct propaganda through demonstrations and educate the public on the prevention, control and care of the disease.

Lieut.-General Hay felt confident that after their training for eight months in Delhi and Kasauli the health visitors would contribute to the alleviation of human suffering in the course of their future duties.

BRITISH COMMONWEALTH AND EMPIRE HEALTH AND TUBERCULOSIS CONFERENCE, 1947

A CONFERENCE on tuberculosis, arranged by the National Association for the Prevention of Tuberculosis of Great Britain, will be held in London on the 8th, 9th and 10th of July, 1947. The conference will deal with tuberculosis in all its aspects, but with special reference to the problem as affecting the British Commonwealth, and representatives from all the Dominions and Colonies have been invited.

The sessions will include discussions on tuberculosis in the British Commonwealth and the Colonial Tuberculosis Services; sanatorium design; after-care and rehabilitation; the psychology of tuberculosis; new discoveries in the prevention and treatment of the disease, and the National Health Service and its effect on tuberculosis schemes.

Plans are being made for overseas guests to see something of the anti-tuberculosis work for which Great Britain is famous, and will include visits to sanatoria, hospitals and clinics, and demonstrations of various kinds. The conference is open to both doctors and laymen, and fuller particulars can be obtained from the Secretary-General, National Association for the Prevention of Tuberculosis, Tavistock House North, Tavistock Square, London, W.C.1.

PENICILLIN FACTS AND RUMOURS

UNDER this heading the Council of Pharmacy and Chemistry of the American Medical Association has issued (*J. Amer. Med. Assoc.*, 1946, 131, 1423) a notice because of unwarranted fears in the minds of the public concerning the value of penicillin and other new remedies, created by recent articles in the lay Press. Physicians, states the notice, should be in a position to

give their patients the facts concerning penicillin and to allay any doubts or fears created by these publications. Briefly, the facts concerning the latest developments in penicillin therapy are as follows:

1. Commercial penicillin has consisted of varying mixtures of one or more of the five known fractions: F, G, X, K and dihydro F.

2. Penicillin K is apparently rapidly destroyed or eliminated in the body, and therapeutic levels are not achieved or maintained in the body fluids following ordinary doses.

3. Commercial penicillin now available is predominantly penicillin G, which is known to be effective, although some of the penicillin produced for a few months in 1945 may have had relatively less G and more K than previous or subsequent batches.

4. As far as facts are available, penicillins F and X are as active clinically as penicillin G. Further research will be necessary to define their usefulness with preciseness.

5. Since precise methods are not available for the routine determination of the quantities of each fraction in each batch of penicillin, the National Research Council has recommended increased dosage of penicillin as a safety precaution, particularly in the treatment of syphilis, in which the end result of therapy cannot be evaluated for a long time.

6. Although bacteria have been made resistant to penicillin in the test-tube development of clinical resistance has not become a problem. Such an eventuality may be prevented, in part, by giving adequate and not minimum doses of penicillin.

7. All penicillin and penicillin pharmaceuticals currently on the market have been examined and certified as to safety and efficacy by the United States Food and Drug Administration.

8. It is possible that natural or synthetic variations of the penicillin molecule will result in the development of a clinically better penicillin. None better than penicillin G is now available.

The presence of penicillin K (under British nomenclature penicillin IV) is also the subject of an annotation in the *Lancet* (1946, ii, 387). The note states that the finding that penicillin IV is less efficacious chemotherapeutically than the other penicillins is of considerable practical importance since commercial penicillin is a mixture of different penicillins with an undefined proportion of penicillin IV. The amounts of the different penicillins in the commercial products depend on the strain of mould used in production and on the composition of the culture medium. Strains used by manufacturers up to 1944 yielded predominantly penicillin II (G), but since 1944 a change has taken place in the commercial penicillin preparations, leading to a fall in their content of II (G) and a rise in IV. Strain Q176, now used by most manufacturers because it gives the highest yield, produces under certain conditions a considerable proportion of IV. During the purification of penicillin now carried out an impurity may be removed which exerts a synergistic effect on the treponemocidal action of penicillin.

DIAGNOSIS OF LIVER ABSCESS

MAJOR C. E. LUMSDEN reports the following instructive case in the *Journal of the Royal Army Medical Corps*, Vol. LXXXVII, No. 2, August 1946 (p. 76):—
'Pte. X, aged 35. Treated for amoebic dysentery in Iraq and pronounced cured. Over a year later in Iraq he developed upper abdominal pain. Examination revealed an epigastric mass, apparently solid. A routine examination of the stool on two occasions disclosed "no amoebic cysts". A clinical and radiological diagnosis of tumour of the stomach was agreed upon and laparotomy performed. This revealed a large "cancer of the stomach already adherent to the liver", regarded as inoperable by the surgeon. The case was transferred to base and reconsidered by a consultant surgeon. Laparotomy was repeated; mass "larger and now definitely inoperable". The patient was evacuated to India—a hopeless case. Patient was grossly emaciated

and the laparotomy wound beginning to break down from secondary cancerous invasion. He died shortly after admission to hospital in India. At autopsy, the "mass" was an amoebic abscess of the left lobe of the liver with inflammatory adhesion to the stomach wall; there was advanced active amoebic colitis; and the "secondaries of the abdominal wall" were nothing other than entamoebal lysis of the abdominal wound.

UNITED PROVINCES MEDICAL COUNCIL

MINUTES OF THE MEETING OF THE UNITED PROVINCES MEDICAL COUNCIL HELD IN ITS OFFICE AT LUCKNOW, ON FRIDAY AND SATURDAY, 15TH AND 16TH NOVEMBER, 1946, AT 11 A.M. AND 1-30 P.M., RESPECTIVELY.

BEFORE the business commenced the following resolution, moved from the Chair, was unanimously passed—all standing:

'The United Provinces Medical Council places on record its expression of deep sorrow at the sad demise of Rai Bahadur Dr. D. D. Pandya, M.B., (Camb.), and of appreciation of the valuable services rendered by him as a member of this Council since 1929, and directs the Registrar to convey a message of condolence to the members of the bereaved family.'

1. The minutes of the last meeting of the United Provinces Medical Council were confirmed.

2. Government notifications nominating Colonel N. Briggs, M.R.C.S., D.P.H., V.H.S., I.M.S., as President and Dr. (Miss) S. S. Naidu, M.B., and Dr. C. P. Mism, M.B., as members of this Council were read and recorded.

3. Considered—With reference to Medical Council resolution no. 7 (10) (a) of March 1946, the case against Dr. Syed Asad Ali, M.B., was considered and, after hearing him and his counsel, the Medical Council unanimously judged him guilty. In view of this practitioner's past military services and his extreme old age, the Council took a lenient view and unanimously decided that a warning only should be issued to him.

As regards the allegations made by this practitioner against the Registrar, the Council took a very serious view of the matter. Dr. Syed Asad Ali and his counsel were therefore recalled. Dr. Syed Asad Ali, however, withdrew the aforesaid allegations and apologized to the Registrar in the presence of the Council for having made such unwarranted and uncalled-for allegations.

4. The case against Dr. Har Datt Pant, M.B., was considered. Since the Council felt that the presence of Dr. Har Datt Pant was necessary, it was resolved that the hearing of the case be postponed. The Council for the practitioner was informed of the postponement.

5. Withdrawn.

6. The Registrar's explanations on the audit and inspection note (no. T/561) on the accounts of the United Provinces Medical Council for the year 1945-46 were approved and accepted.

7. The statement of income and expenditure of the Council for the year 1945-46 was considered and approved. The excess expenditure over the budgeted allotments under some heads of expenditure was sanctioned.

8. The budget estimates of the Council for the year 1947-48 and the revised budget for the year 1946-47 were passed unanimously.

9. The case against Dr. Man Mohan Prasad Hajela, L.S.M.F., was considered and after hearing the practitioner, it was unanimously decided that the explanation of this practitioner was satisfactory and that no case had been proved against him. The practitioner was thereupon informed accordingly.

10. The case against Dr. Mashkur Ahmad, M.B., B.S., was considered and, after hearing him and his counsel, the Council accepted his explanation as satisfactory and decided that no further action was necessary.

The following resolution was then passed:

'That the attention of the State Medical Faculty be drawn to the fact that the certificate forms need clarification. It should be made clear on the form

whether a certain statement made therein is on the personal knowledge of the certifying medical practitioner or is based on the statement of the compounder concerned.'

11. The case against Dr. Brij Bhushan Lal Dargar, L.C.P.S., was considered.

In view of the departmental action which has already been taken against this practitioner, the Council decided that no further action was called for.

12. The case against Dr. Sudhir Chandra Ghose, L.M.P., was considered and Dr. Ghose and his counsel were heard.

In view of the fact that his name has been erased by the Bihar Council, with which body this Council is on terms of reciprocity, it was unanimously decided that a similar action should be taken by this Council also.

13. Resolved that in view of the loss having occurred on war services, a duplicate copy of the registration certificate may be supplied to Dr. Lakhan Singh free of charge.

14. Resolved unanimously that Rai Bahadur Dr. B. N. Vyas should be re-elected to represent this Council on the Board of High School and Intermediate Education.

15. Resolved unanimously that Captain H. N. Shivapuri should represent this Council on the Council of Physical Culture.

16. Resolved that the L.M. Diploma granted by the National Maternity Hospital, Dublin, be recognized for registration in this province as an additional qualification.

17. Resolved that the L.M.P. (Orissa) qualification may now be recognized for registration in this province.

18, 19 and 20. (Please see proceedings of the second day's sitting.)

21. Resolved that the sitting members of the standing committee may continue during the year 1947 with Rai Bahadur Dr. Rameshwar Singh in the place of the late Rai Bahadur Dr. D. D. Pandya, M.B., (Camb.).

(Proceedings of the second day's sitting)

18. Resolved that this Council is in agreement with the proposal of the Medical Council of India of adding a third group to the proposed All-India Medical Register.

19. The question whether any further representation to Government was necessary now that Parts I and II of the United Provinces Indian Medicine Act (X of 1939) have been enforced was considered and the Council passed the following resolution:

'Now that the United Provinces Indian Medicine Act has come into force, the Medical Council desires to bring to the notice of the Provincial Government that the examinations and syllabus laid down for registered Vaid and Hakims do not provide adequate training to qualify them to issue the various certificates (Injury, Age, Birth, Death, Medical, Physical Fitness certificates, besides other certificates) which they are now empowered to do under the above Act. Medical certificates require a thorough knowledge of Medical Jurisprudence which is broadly based on the knowledge of Anatomy, Pathology, Medicine, Surgery, Chemistry and Toxicology in which this class of practitioners are not thoroughly trained. Some of these subjects are not taught at all.

It would not therefore be in the interest of the public, in fact it would be dangerous to, to authorize these practitioners to give evidence at Inquests and Courts of Law and to have privileges under the Excise Act.

20. Postponed.

21. (Please see the proceedings of the first day's sitting.)

22. The report of the Standing Committee, dated 14th November, 1946, was considered, and its recommendations were accepted with the exception of one item the consideration of which was postponed.

23. The report of the Sub-Committee, dated 23rd September, 1946, and the amendments proposed thereto, were considered, and the Council approved certain

amendments to be made to the United Provinces Medical Act and the rules and regulations thereunder.

N. BRIGGS,
COLONEL, I.M.S.,
President, Medical Council,
United Provinces.

R. N. SHUKLA,
Registrar, Medical Council,
United Provinces.

PUNJAB MEDICAL COUNCIL

PROCEEDINGS OF A MEETING OF THE PUNJAB MEDICAL COUNCIL HELD IN THE COMMITTEE ROOM OF THE OFFICE OF THE INSPECTOR-GENERAL OF CIVIL HOSPITALS, PUNJAB, LAHORE, ON SATURDAY, 30TH NOVEMBER, 1946, AT 10 A.M.

BEFORE transacting the business the President on behalf of the Punjab Medical Council extended a welcome to Dr. K. R. Chaudhri a newly elected member to the Punjab Medical Council in place of Khan Bahadur Dr. K. A. Rahman, O.B.E.

The Punjab Medical Council also placed on record their deep appreciation of the services of Khan Bahadur Dr. K. A. Rahman during the long period of 24 years during which he has been a member of the Punjab Medical Council.

1. The proceedings of the last meeting held on the 10th April, 1946, were confirmed.

2. Considered the recommendations of the Executive Committee of the Punjab Medical Council held on the 12th November, 1946 (Appendix).

Resolved (i) that the recommendations of the Executive Committee of the Punjab Medical Council held on the 12th November, 1946, at item nos. 1 and 3 to 16 be approved.

(ii) Item no. 2. Resolved that the name of Dr. Miss Jaywanti C. Gujar, M.D. (Paris) be recommended to Government for registration on the Punjab Medical Register.

(iii) Item no. 17. Resolved that Dr. Shankar Dass Mehra be further advised that the Council views with disfavour any case in which suspicion arises from certificates given without personal examination of the case at the actual time. The Council directed the President to advise Dr. Shankar Dass Mehra that the procedure adopted by him is irregular.

3. Considered the appointment of a member on the Punjab Nurses Registration Council.

Resolved that Dr. Mrs. Shakuntla Prem Chandra, M.B., B.S., be appointed a member of the Punjab Nurses Registration Council. Carried.

4. Considered the audit and inspection note on the accounts of the Punjab Medical Council for the period July 1945 to June 1946.

Resolved (i) that the audit note be recorded and that sanction be accorded to :—

(a) The purchase of a daily *Tribune* for the office of the Punjab Medical Council.

(b) To the advance of a sum of Rs. 250 to Clerk Balwant Singh out of his Provident Fund Accounts.

(c) To the expenditure of Rs. 20 incurred in connection with the fees to members over the sanctioned Budget Estimates.

(d) To the adopting of the scale of stationery sanctioned by the Punjab Government for its employees.

Resolved (ii) that the fee paid to members for attending meetings of the Punjab Medical Council or its Sub-Committees be restored to the previous fee of Rs. 32 from Rs. 20 which reduction was voluntarily offered by the Council in time of financial stress. This should take effect from the meeting held on the 30th November, 1946.

5. Considered the Supplementary Estimates for the year 1946.

Resolved that the Supplementary Estimates for the year 1946 be approved.

6. Considered the Budget Estimates for the year 1947.

Resolved that the Budget Estimates for the year 1947 be approved.

7. Considered Punjab Government letter No. 7727-M-46-29127, dated 11th November, 1946, re. amendment of rule 40(2) of the rules of the Punjab Medical Council.

Resolved that Government be informed that in the opinion of the Council no amendment in rule 46(2) is necessary. The Council will exercise its functions under rule 40(2) of the Act when it so desires—and generally as an august body this power is necessary—but notes that it may in cases where less punishment is necessary act under Section 10(2) of the Act. The Council considers this legal and will invariably specify the Section of the Act or Rule under which such action is taken.

8. Considered letter No. 1-97/46/PH(ii), dated 25th November, 1946, from the Public Health Commissioner with the Government of India, re. a yellow fever inoculation certificate issued by Dr. Kh. Ahmad Sadiq, M.B., B.S.

Resolved that Dr. Kh. Ahmad Sadiq be served with a notice to appear before an extraordinary meeting of the Punjab Medical Council—which will be held for the purpose in the month of January 1947—to show cause why his name be not removed from the Punjab Medical Register.

(ii) Resolved that Lieut.-Colonel C. M. Nicol, D.P.H., I.M.S., Director, Public Health, Punjab, be requested to prepare a detailed note on the yellow fever problem and the technique required for its inoculation which be placed before the meeting called especially to consider the case of Dr. Kh. Ahmad Sadiq. The Council considers that the matter is of such an importance to the province that special steps are necessary to advise the profession in this matter.

9. Considered whether the booklet (*Tuberculosis*) issued by Khan Sahib Dr. Riaz Ali Shah a registered medical practitioner constitutes an advertisement.

Resolved that the explanation of Khan Sahib Dr. Riaz Ali Shah be called for in the matter and he be further asked to state and furnish the advertisements issued for the sale of his book *Tuberculosis* in the various papers and journals and also the comments published in the Press on this publication. This explanation be considered at the meeting to be held in January 1947.

(Sd.) D. CLYDE,

COLONEL, I.M.S.,

President, Punjab Medical Council.

(Sd.) HANS RAJ,

Registrar, Punjab Medical Council.

APPENDIX

PROCEEDINGS OF A MEETING OF THE EXECUTIVE COMMITTEE OF THE PUNJAB MEDICAL COUNCIL HELD IN THE COMMITTEE ROOM OF THE OFFICE OF THE INSPECTOR-GENERAL OF CIVIL HOSPITALS, PUNJAB, LAHORE, ON TUESDAY, 12TH NOVEMBER, 1946, AT 2 P.M.

1. Considered the application of Dr. H. M. Jagan Nath Rao, M.B., B.S. (Mysore University), for registration on the Punjab Medical Register.

Recommended that the name of Dr. H. M. Jagan Nath Rao, M.B., B.S. (Mysore University), be registered on the Punjab Medical Register and the qualification of M.B., B.S. (Mysore University) be brought on the schedule of qualifications registrable on the Punjab Medical Register.

2. Considered the application of Dr. Miss Jaywanti C. Gujar, M.D. (Paris), 1942, for the registration of her name on the Punjab Medical Register.

Recommended that a reference be made to the Bombay Medical Council with regard to their attitude in respect of Indian Nationals holding foreign medical degrees and the reply be placed before the next meeting of the Punjab Medical Council where the case of Dr. Miss Jaywanti be further considered.

3. Considered the application of Dr. Mrs. K. Selzer, M.B. (U. Rome), for registration of her name on the Punjab Medical Register.

Recommended that in view of the fact that she advertised herself in October 1937, her name be not registered on the Punjab Medical Register.

4. Considered the case of Dr. Bakhtawar Singh Jain, L.R.C.P. & S., who was registered provisionally on the Punjab Medical Register.

Recommended that a reference be made to the authorities of the Royal College of Physicians and Surgeons, enquiring as to whether Dr. Jain still continues to hold their qualifications in view of the fact that his name has been removed from the British Medical Register and his case be reconsidered when the reply is to hand.

5. Considered letter dated the 5th June, 1946, from the Superintendent of Post Offices, Ambala, re. a medical certificate issued by Dr. Sumer Chand Gupta and the explanation of Dr. Gupta thereon.

Recommended that no action is called for against Dr. Sumer Chand Gupta.

6. Considered the representation of Dr. Faqir Chand for the restoration of his name to the Punjab Medical Register.

Recommended that the name of Dr. Faqir Chand be restored on the Punjab Medical Register and that the State Medical Faculty be approached to amend their rules so that it may not be obligatory on the Faculty to declare the diploma of a person whose name has been removed from the Punjab Medical Register void.

7. Considered letter dated 6th May, 1946, from the New India Literature Co., Lahore, re. publication of career sketches of the registered medical practitioners.

Recommended that the publication of facts about the career of a registered medical practitioner is permissible but the statement should not savour of an advertisement, as does the instance on which the Council have been asked to deliberate.

8. Considered the explanation of Dr. Kishan Chand of Sialkot City re. association of his name with 'Dr. Kishan Chand & Co., Ltd. Chemists'.

Recommended that Dr. Kishan Chand be asked to take steps to disassociate his name with the firm.

9. Considered letter no. 13864, dated 11th December, 1946, from the Civil Surgeon, Amritsar, re. a certificate issued by Dr. Gopal Singh Sekhon, L.S.M.F.

Recommended that no action is called for against Dr. Gopal Singh Sekhon.

10. Considered letter no. 7704, dated 24th September, 1946, from the Civil Surgeon, Amritsar, re. a medical certificate issued by Dr. Sant Dass, M.B., B.S.

11. Considered letter, dated 27th August, 1946, from Dr. Harish Chander, re. a printed postcard circulated by Dr. Kirpa Ram Sud, M.B., B.S., and the explanation of Dr. Kirpa Ram Sud thereon.

Recommended that Dr. Kirpa Ram Sud, M.B., B.S., be served with a notice to appear before the Punjab Medical Council and show cause why his name be not removed from the Punjab Medical Register.

12. Considered the explanation of Dr. Shiv Lal Bhatia, L.S.M.F., re. an Urdu poster circulated about his eye clinic.

Recommended that Dr. Shiv Lal Bhatia be advised in his own interest to take steps to see that his name is not advertised directly or indirectly.

13. Considered the question of the removal of the name of Dr. Harnam Singh who has been convicted by a Court of Law under the Defence of India Rules for granting untrue medical certificates.

Recommended that the name of Dr. Harnam Singh be removed from the Punjab Medical Register and that the President be authorized to restore his name on application.

14. Considered the question of the removal of the name of Dr. Narsingh Dass Gulatia, L.S.M.F., from the Punjab Medical Register in view of the fact that

he has been convicted under the Dangerous Drugs Act.

Recommended that the name of Dr. Narsingh Dass Gulatia be not removed from the Punjab Medical Register.

15. Considered endorsement no. 9090-C.II., dated 9th September, 1946, from the I. G. G. H. Punjab, re. Captain Gajinder Singh who has been declared insane.

Recommended that the Punjab Government be requested to make suitable provision in the Punjab Medical Registration Act amendments to which have already been suggested by the Council to authorize the Punjab Medical Council to remove the name of an insane registered medical practitioner from the Punjab Medical Register.

16. The Executive Committee agreed to raising the price of Annual Medical List for the year, 1946, from Rs. 5 to Rs. 8 in view of the high cost of printing.

17. Considered the explanation of Dr. Shankar Dass Mehra, re. a medical certificate issued by him.

Recommended that no action is called for against Dr. Shankar Dass Mehra.

(Sd.) D. CLYDE,
COLONEL, I.M.S.,

President, Punjab Medical Council.

(Sd.) HANS RAJ,
Registrar, Punjab Medical Council.

WOMEN DOCTORS' TRIUMPH

SUCCESS OF WOMEN'S HOSPITALS IN AUSTRALIA

By SUSAN BARRIE

Canberra, Australia

THE Rachel Forster Hospital for Women and Children, Sydney's newest and most modern hospital, is staffed and conducted by women for the benefit of women. It was founded by a woman, and women have the last word in its administration.

To-day, it is one of the outstanding organizations of Australia's largest city, but it rose from a humble beginning. Its history is also a history of women's fight for recognition in the medical profession.

Directly after the first world war, it was difficult and often impossible for a woman doctor to obtain a hospital appointment in Australia, and opportunities for specialization were few and far between. There was in fact a very strong prejudice against women in the medical profession. But Dr. Lucy Gullett and Dr. Harriet Biffin were not deterred. They were two resolute and independent women, and they went to work to establish a hospital which would serve a twofold purpose; it would provide treatment for necessitous women, and it would at the same time form a centre for work among women doctors and a training school for women specialists in every field.

They began in 1922, with Rs. 10,708 subscribed by sympathizers, and started a 'new hospital for women and children' in a small dilapidated house in Surrey Hills, a densely populated suburb of Sydney.

In the words of Lucy Gullett, the hospital was 'a tiny place, and we could only treat out-patients, but it was the beginning of the fulfilment of a dream'. On the first day it was opened, one solitary patient attended, and the two women felt that her courage almost merited a decoration. But during the ensuing year they treated more than 6,000 women.

From that time onward, the hospital made rapid and continuous progress. The original conception of a women's hospital grew out of all recognition, until the two founders were amazed by the result of their effort.

In 1924, so great was their progress, that they were compelled to buy a larger building to house their growing organization. This time it was in Redfern, a

nearby suburb. It was here that the new hospital was opened in the following year, and named the Rachel Forster Hospital for Women and Children, in honour of Lady Forster, wife of the then Governor-General of Australia, who had been interested in the work since it began.

Year by year new departments were added to the hospital; departments for venereal diseases, dentistry, physiotherapy, ear, nose and throat work, psychiatry, child guidance and rheumatism treatment. In 1932, a new wing was built to cater for the rapidly increasing number of out-patients and to establish a pathology department.

By 1937, the efforts of the women doctors were rewarded by Government recognition of the Rachel Forster as a public hospital. Up to that time the hospital had provided all its own funds, but had never been in debt. In that year, when annual attendances of out-patients numbered 60,000, it became clear that expansion was necessary, and the Minister for Health supported the proposal to build a new hospital that would provide accommodation for 124 in-patients. Land was bought in Redfern, near the old site, and a new hospital was built in 1941 at a cost of Rs. 14,99,170.

To-day the Rachel Forster Hospital is housed in an ultra-modern, stream-lined building which reflects the feminine touch in its pastel colour-scheme and clever combination of the utilitarian with the decorative. The hospital has been planned to give the maximum of light, and glass is used to good effect in all sections of the building. On the north-eastern side of the five-story block, where the sun streams into the wards across spacious verandahs, the walls and ceilings are washed in cool, pale shades of green and blue. On the shady side of the building, rooms are decorated in warmer shades of soft pink and yellow. There is a specially designed children's ward, equipped with a solarium, and the nurses' quarters are especially attractive with comfortable gaily furnished sitting-rooms and a pleasant bedroom for each girl. Bathrooms, washing, drying and ironing rooms are equally modern and convenient.

Dr. Mary Puckey, a graduate of the Sydney University, administers the hospital, and combines the jobs of Chief Executive Officer and Medical Superintendent. She is assisted by four resident women doctors and a visiting staff by forty-five doctors, of whom nine are men. The board of directors is composed entirely of women, under the leadership of a woman president. The office staff is composed of women, and a city office run by women, deals with publicity and collection of funds.

The x-ray and pathology departments and the dispensary are also staffed by women, and an extensive social services department is in charge of women almoners.

The Rachel Forster Hospital has now one of the largest out-patient departments in Sydney, last year it cared for 50,000 patients, and the in-patients numbered 1,600. The venereal diseases clinic for women is the largest in New South Wales.

The new hospital, completed just before the war, was planned to allow for growth and expansion. The present main block will take a complement of 124 in-patients, but plans for development include additional nurses' quarters, an up-to-date maternity block, and a new convalescent home, to be called the Lucy Gullett Convalescent Home, in recognition of the pioneering work done by the founder, Dr. Gullett.

The Rachel Forster Hospital has an excellent system of finance. Besides periodic special drives for funds, there are two continuous sources of revenue, the Rachel Forster Hospital 'Centres' (groups of voluntary helpers who organize fêtes, dances, card parties, egg days, and collect during drives for funds), and an outdoor collection scheme.

Outdoor collections are conducted by a team of women who work on a roster system with collection boxes, or make regular 'house-to-house' visits in

allotted districts. There are 25 to 30 of these workers, under the direction of a special supervisor. They join the hospital staff on a fixed salary, receive no commission, but are all enthusiastic about bringing in good donations for the hospital.

Recently a new source of revenue was devised through establishment of the Rona Convalescent Home, where women and children can recover from their illnesses in healthy, congenial surroundings. Profits from fees paid by these patients goes to general hospital funds.

The hospital is subsidized by the Australian Government at the rate of Rs. 3-3 a day for each occupied bed.

Patients admitted to the hospital can choose to occupy 'public' or 'intermediate' wards, or private rooms. If they enter a public ward, they pay nothing, neither hospital nor medical fees. Intermediate ward patients pay Rs. 45 a week in a four-bed ward, or Rs. 56-10 a week in three-bed wards, less the Rs. 3-3 a day (Rs. 22-5 a week) allowed to the hospital under the Commonwealth Government Benefit Scheme. Patients who occupy private rooms pay Rs. 67-8 a week, again less Rs. 3-3 a day subsidy. Both private and intermediate patients pay their own doctors' fees, and for special treatment.

There is no means test—patients may be 'public' or 'private' by their own choice.

There is no charge for medical attention to out-patients, but those who can afford it, pay cost price for their medicines. The highest price ever paid by one patient is approximately Re. 0-9-3 but many pay nothing.

The hospital is not unique in Australia, for it was built on the pattern of the Queen Victoria Hospital, in Melbourne, Victoria. The Melbourne Hospital, too, was founded for women by women, to be run by women. The history of these two great institutions has shown that in Australia, at any rate, women in the medical profession have met men on their own ground, and proved their equality.

HUNDRED YEARS OF HEALTH SERVICES

MANY public authorities in Britain will this year hold health exhibitions to celebrate the centenary of the first medical officer of health appointed in Liverpool in January 1846.

Liverpool's lead was followed quickly by the City of London, which appointed the famous surgeon, Sir John Simon, then only 30 years old.

In 1846, the expectation of life was 20 years; to-day, it is well over 50. The mortality rate of babies in large towns was 150 per 1,000 births; to-day, it is less than 50 for the whole of Britain. In 1847, 23 people out of every 5,000 living in London died from tuberculosis; to-day, the death rate is 4 per 5,000.

Scarlet fever, whooping cough and measles killed 21 out of every 10,000 Londoners; in 1945, deaths were 1 in 10,000. A century ago, deaths from smallpox in London were 22 per 50,000 of the population; in 1889, there was only one, and in 1945 none.

Eight out of 10 babies who were doomed to die in 1847 now live on.

United Kingdom Publicity Services.

LONDON,
16th January, 1947.

L.T.M. COURSE 1947 AT THE CALCUTTA SCHOOL OF TROPICAL MEDICINE

THE three months' course of instruction for the Licentiate in Tropical Medicine will begin from the 15th July, 1947. Applications for admission should be submitted as early as possible to the Director, School of Tropical Medicine, Calcutta.

Public Health Section

SICKNESS ABSENTEEISM AND RECORDING IN INDIAN INDUSTRIAL ESTABLISHMENTS

By E. LLOYD JONES, M.D. (Vict.)
MAJOR, I.M.S. (F.C.)

WITH increasing industrialization in India the problems of absenteeism of all kinds are bound to become more and more marked. There is no need to elaborate the ill effects of absenteeism upon production, but that they can be most serious is universally accepted. When workers are absent, often without warning, valuable machinery is allowed to stand idle, or is not used to its full productive capacity, which results not only in loss to the employing firm, but eventually to the workers and the community as well.

Absenteeism due to other causes than sickness comes within the province of the works personnel department, or the psychologist working in the personnel department rather than that of the works doctor, or the general practitioner working in an industrial area. This type of absenteeism will therefore not be discussed further.

Absenteeism which is due to sickness can be divided into two main classes, that which in the present stage of development of medical knowledge may be regarded as inevitable, and that which can certainly be prevented. The main interest of the works doctor, or the general practitioner working in an industrial area is in that class of sickness absenteeism which can be prevented, either by preventive health measures, or by early and efficient treatment of the diseases which cause it. From the restricted point of view of pure absenteeism, it does not matter very much whether the sickness is directly connected with the nature of employment, such as for example lead poisoning among pottery workers, or whether it has no apparent connection with the nature of employment, such as for example venereal disease or typhoid fever. Both types of sickness cause absence from work, and are therefore the close concern of the works doctor.

The problem of reducing sickness absenteeism can only be tackled adequately if there is accurate information as to its total amount, for comparison with similar figures in other countries, and also for purposes of comparison between sickness rates in different industries in India, or between different factories or groups of factories, or even between different departments of one factory. Data of this nature is readily available in other countries where there is a large industrial population. For example in the United Kingdom the total number of days lost annually through sickness by workers insured

under the National Health Insurance Act before the war was about 15. In America the figure was rather lower. In Germany from 1922 to 1931 the figure was about 12 days per worker per year. Information on total sickness absence from all causes in Indian industrial establishments, however, is at present very sketchy, since very few such establishments keep accurate records of sickness absence, and many firms maintain no records at all.

Furthermore, it is quite clear that if any real progress is to be made towards combating sickness absenteeism, not only is it necessary to know how much total sickness there is, but also to ascertain in the first instance on broad and general lines what is the nature of that sickness, how much of it is due to the immediate conditions of employment, how much can be regarded as inevitable, and how much is definitely preventable. To do this necessitates some form of sickness recording.

The possible methods of sickness recording may be divided into two main categories, that based on the works timekeeper, and that based on the works medical officer. Both methods are in common use in other countries, and each has its advantages, a combination of both, of course, being best of all.

Sickness recording by the works timekeeper

Sickness recording based on the works timekeeper will be dealt with first. In this method the works timekeeper makes an appropriate entry on the workman's daily time sheet showing that he is absent, and various symbols or signs may be adopted to reveal the alleged cause of the worker's absence. The information derived in this way is very useful. For example it gives information about genuine reasons for absence from work apart from sickness. But from the industrial health point of view its value is rather limited. If an accurate estimate is to be made of sickness as a factor in absenteeism it is important to be as certain as possible that any sickness recorded shall be genuine. It is not to be accepted that every time a man asks for time off work on account of sickness that man is necessarily ill and unfit for work. A man wants a day or half a day off to see a hockey match or for some other purely personal reason. The easiest way is to send a note to his employer to say that he has fever, or diarrhoea. In this way he does not get blamed for his absence, which he probably would do if he merely said that he wanted to go to the hockey match. This situation is of course not peculiar to India by any means. It is very difficult to check up on this type of absence of short duration. It may be perfectly genuine, but much more often it is false. One way to reduce it is to insist that not even one day's absence from work will be

permitted without a medical certificate. In most works this would be impracticable.

Even if the certificate of an outside medical practitioner is accepted as evidence of incapability for work there are many sources of possible error. Medical practitioners all over the world have a pronounced objection to any form of clerical work and certificates are often issued with little regard to strict accuracy of diagnosis. The doctor is not always to be blamed for this. It is often very difficult to give a firm opinion as to whether a man is fit for this work or not in the absence of definite physical signs. All practising doctors must be familiar with the man who comes and says he has severe neuralgia, or feels sick or dizzy, or that he had a high temperature earlier in the day. It would need a magician to say in all cases whether that man is genuine or not and few doctors would willingly refuse him a certificate, in case there happened to be something seriously wrong with him which was not apparent at the time of examination. In this way a man may obtain a sickness certificate, and be shown as sick, when in point of fact he may have been perfectly well, and merely wanted to go to see the hockey match. The certificates will ultimately be collected in the office of the works timekeeper, but they will be of limited value for statistical purposes, as their degree of detail and accuracy will be insufficient to draw very much in the way of useful conclusions from them. Information as to sickness absenteeism gathered in this way must therefore be regarded with a very cautious eye. At the same time this form of sickness recording is the only one possible when there is no comprehensive system of health care for workers, or in the absence of a medical scheme in connection with the works itself and although it is limited in value, it is very much preferable to nothing at all.

Sickness recording by the works medical officer

Where there is a system of medical attendance in connection with a factory or a group of factories, much better methods of sickness recording are possible, provided there is a reasonable degree of continuity of employment, and the medical facilities are such that the works doctor has sufficient time at his disposal to examine and treat his patients properly, and to keep brief clinical records of those patients he treats. Experience shows that in ordinary conditions a doctor can be responsible for about 2,000 workers, provided he is employed full time, and is not allowed to divide his attention between his works duties and private practice. A total 'list' of 2,000 workers gives an average daily attendance at the dispensary of about 60 patients, which, if the doctor spends five hours daily seeing patients in the dispensary, allows of an average of five minutes with each patient.

The basis of the system of sickness recording based on the works doctor is in the individual medical record envelope, and medical record

eards for each worker. It is of course essential that a worker should be assigned to one specific dispensary and preferably to one individual doctor. Each worker on joining the factory is given a serial number and a personal medical card, which is his evidence of his entitlement to medical treatment. If there are several dispensaries or doctors attached to a large works, he should be allowed to choose the one he would like to attend, provided there are vacancies. Having once been assigned to a dispensary or a doctor for treatment he should not be allowed to change except at certain fixed periods of the year, such as for example the end of the year, or the half year. Emergency treatment may of course be obtained at any dispensary. The assignment of a worker to one dispensary is necessary in order to obtain some degree of continuity of treatment and recording. A medical record envelope (see figure 1) is then

<u>WORKS MEDICAL SCHEME</u>	
<u>NAME</u> -----	<u>NO.</u> -----
<u>ADDRESS</u> -----	<u>SEX</u> -----
<u>DEPARTMENT</u> -----	
<u>DATE OF ENTRY</u>	
<u>INTO EMPLOYMENT</u> -----	
<u>AGE ON ENTRY</u> -----	
<u>WEIGHT ON ENTRY</u> -----	
<u>HEIGHT ON ENTRY</u> -----	
<u>VACCINATION</u> -----	
<u>T.A.B.</u> -----	
<u>DIED</u> -----	<u>CAUSE OF DEATH</u> -----
<u>LEFT EMPLOYMENT</u> -----	

Medical Record Envelope [1/2 size]

Fig. 1.

sent to the dispensary to which the worker has been assigned, where it will be filed alphabetically until such time the worker requires treatment.

When the worker requires treatment and attends the dispensary he first of all collects his medical record envelope from the clerk, who

inserts in it a medical record card (see figure 2). The worker hands this to the doctor. Having examined the patient the doctor makes entries in the appropriate columns on the card showing the date of attendance, whether a certificate of incapacity was issued, short clinical notes, and a diagnosis. He also enters in the appropriate column the disease group into which the diagnosis falls. This requires further explanation.

YEAR			NAME	No.	
Date	Attend	Cert.	CLINICAL NOTES	Diagnosis	GROUP
•					1 •
•					2 •
•					3 •
•					4 •
•					5 •
•					6 •
•					7 •
•					8 •
•					9 •
•					10 •
•					11 •
•					12 •
•					13 •
•					14 •
•					15 •
•					16 •
•					17 •
•					18 •
•					19 •
•					20 •
•					21 •
•					22 •
•					23 •
•					24 •

Medical Record Card [1/2 size]

Fig. 2.

In order to obtain information as to the different types of sickness which are causing absenteeism, it is necessary to classify sickness and accidents into groups, which can be recorded on the medical record cards. The type of medical record card used will vary according to the needs of a particular factory or group of factories, and according to the degree of detail into which it is proposed to enter. Probably the best is the punched card of the 'Findex' type as illustrated in figure 2 which permits of easy sorting by hand without the use of expensive and complicated machinery. The card is ready punched with holes along each side. Each hole may be accorded any significance according to the needs of any particular factory, but the first 20 holes or so should be retained for group classification of diseases and

numbered 1 to 20 accordingly. The remaining holes may be used for sorting workers from different sections of a factory, or from different factories from among a group of factories.

There is no special standard for the classification of sickness and accidents into groups, except that the number of groups should not be too large, otherwise the whole procedure becomes unwieldy. Each group should, however, be assigned a number, and it is this number which the doctor enters on the medical card of each worker attending for treatment. The following is a fairly simple classification of diseases into groups, which it is considered should generally be suitable for conditions in Indian industrial establishments. It will be observed that it provides not only for classification of diseases, but also for accidents occurring in the course of employment, and for industrial diseases.

Group 1. General infections, but excluding malaria, syphilis, and tuberculosis.

Group 2. New growths, both simple and malignant. All sites.

Group 3. Diseases of nutrition and metabolism, and of the endocrine glands.

Group 4. Malaria.

Group 5. Other undiagnosed fevers.

Group 6. Dysentery, amœbic, bacillary, and diarrhœa.

Group 7. Diseases of the blood and circulatory system.

Group 8. Diseases of the respiratory system, but excluding tuberculosis and new growths.

Group 9. Diseases of the digestive system, but excluding tuberculosis, new growths, dysentery, typhoid fevers and diarrhœa.

Group 10. Diseases of the genito-urinary system, but excluding syphilis, gonorrhœa, tuberculosis and new growths.

Group 11. Pregnancy and the puerperium, and the diseases thereof.

Group 12. Diseases of the skin and cellular tissues, but excluding occupational dermatitis.

Group 13. Diseases of the nervous system and sense organs, and mental diseases, but excluding syphilis, tuberculosis and new growths.

Group 14. Rheumatic diseases.

Group 15. Venereal diseases, including syphilis and gonorrhœa, all sites and stages.

Group 16. Tuberculosis, all sites and stages.

Group 17. Accidents arising in the course of, and as a result of employment.

Group 18. Scheduled industrial diseases, and other diseases arising in the course of, and as a result of employment.

Group 19. Unclassified conditions.

To return to our patient. The doctor has entered in the appropriate column the number of the disease group into which the diagnosis falls. The medical record card is then returned to the clerk, who cuts out the edge of the correct punched hole on the card, converting the hole into a slot. The card is then replaced in

its envelope, and returned to its proper position in the filing box.

It will be a simple matter to extract the cards of all the workers who have received treatment during the quarter, and to find out how many working days have been lost by all the workers in each particular disease group. This is done by inserting a long needle through the holes of each disease group in turn in the bundle of cards, and shaking the bundle, when all the cards in the group concerned will fall out, since the original holes have been converted into slots.

In practice it will be found convenient to keep one side of a medical record card for one year, and the reverse for the following year irrespective of whether the space on the card has been completely filled or not. At the end of each quarter the card should be ruled right across with red ink. All this sounds complicated on paper but in practice it is very easy.

What is the nature of the information which it is possible to obtain in this way? Suppose we assume a factory or group of factories employing 4,000 workers. This would necessitate the employment of two doctors. By the method already described it would be an easy matter at the end of each quarter to ascertain how many working days have been lost during the quarter in each of the disease group. For example you may find that in one particular quarter 8,000 working days lost, 1,000 have been lost owing to diseases of the respiratory system. If the factory is one where there is a lot of dust you would then naturally try to find out whether there was any connection between the dust and the chest troubles, and if there were, it would certainly be well worth while from everyone's point of view to take some trouble to deal with the free dust in the atmosphere by means of some mechanical method of dust extraction.

This system of recording then would give you a detailed picture of the health state of the workers in any factory or industry. In addition to that it would also ensure that for every worker there was a written and permanent record of his state of health. There is no need to stress the immense value of such a record from the point of view of individual treatment. There is no danger of the man's doctor forgetting his patient's previous conditions; his weight and other valuable data will be periodically recorded; if he changes to a fresh doctor there will always be his previous medical history available for ready reference.

The system as a whole has other decided advantages. Since the doctor will have a fairly stabilized clientele from among the workers he will gradually get to know his patients as individuals, get to know their family circumstances, their difficulties, their weak points from the health aspects. He will thus be able to advise them with regard to their health instead of merely advising them about their diseases, that is adopt a positive attitude towards the

health of the individual and the community. Provided a doctor is not overloaded with patients there is no reason why periodical examinations of the patients in his list should not be made quite apart from any question of illness. The findings at such examinations could be recorded on a separate health card which could be inserted into the medical record envelope. In this way a constant check would be kept on the health state of each individual worker, and diseases often detected in the earliest stages when they are most amenable to treatment.

This is not a plea for recording for the sake of recording. The advantages of proper record of sickness are beyond all possible doubt. Nor are those advantages confined to one particular class. The worker benefits, and experience in other countries, notably the United States of America, has shown clearly that the institution of a proper system of medical recording, such as has been described, results in the long run in actual monetary advantage to employers, and to industry and the community as a whole. If India is to establish her rightful place in the industry and commerce of the world, she must be prepared to adopt modern scientific methods, not only in the actual machinery of production, but also with regard to the health and well-being of the workers engaged in that production. For this a proper system of recording of sickness occurring in industry is an essential prerequisite.

THE RÔLE OF THE WORKS DOCTOR, OR GENERAL PRACTITIONER, IN INDUSTRIAL MEDICINE

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WITH increasing industrialization in India, more attention is being paid to the Indian industrial worker and his health and well-being.

It is a common fallacy that to obtain satisfactory results in industrial medicine highly-trained specialists and technicians are essential in the first instance. This is reflected in a tendency to send doctors overseas for prolonged training in industrial medicine. That a large number of such specialists will ultimately be required is undoubted, but the fact remains that the corner-stone in any comprehensive scheme to improve the health of the industrial worker is the ordinary works doctor, or failing him the general practitioner working in an industrial area.

Unfortunately in India at the present day, the works medical officer and the general practitioner are largely wasted so far as industrial health is concerned, since very little is done in the way of recording the sickness and accidents they treat, or making any attempt to correlate the work of the various doctors concerned. In certain Indian industrial establishments there may be

one or more medical officers attached to a factory or a group of factories. In the majority of factories, however, there is not even this, and the workers are left to the mercies of whatever medical facilities are available in the town in which the factory is situated, which are often very meagre. Even where there is a factory medical service in existence the function of the medical officer is only too often merely to treat sick workers when they apply for treatment, either for sickness or for the results of accidents within the factory. Often the number of workers for whose treatment the doctor is responsible is very large, so that even the treatment provided is perforce given in a hurried and perfunctory fashion. In very few factories is there even the simplest method of sickness recording. The result is that what medical work there is in connection with works medical schemes is carried on in a haphazard fashion, and although individual medical officers may have their own ideas as to the various types of sickness which cause absenteeism in the industry concerned, they have no means of correlating the material they gather, or of comparing notes with medical officers of other and similar establishments.

If India is to attain her rightful place in world industry and commerce, Indian industrialists must realize that the health of the worker is one of their most valuable assets, and must foster any attempt to improve it by taking a live interest in the health and welfare of their employees. The institution of a system of sickness recording is one of the first steps which should be taken to attain this objective.

The progress of industrial medicine in other countries where there is a high degree of industrialization indicates the path to be followed, and statistics show quite clearly that the higher the development of the works medical services in any country, the better is the health of the worker, and the less is sickness absenteeism. In fact figures of sickness absenteeism bear a very close relationship to the degree of development of factory medical services. In the United States of America, where factory medical services are the rule rather than the exception, the sickness absenteeism rate is about 9 days per worker per year, whereas in England, where factory medical services, although increasing, are still relatively undeveloped, the sickness absenteeism rate is probably half as much again as this.

The way to reduction of sickness absenteeism lies through the works medical officer, but it is a prerequisite that there should be a proper system of sickness recording, so that the results of his work shall be available for statistical investigation, and preventive measures instituted in order to take fullest advantage of the information obtained.

There could be no better illustration of the possibilities of the ordinary general practitioner in connection with industrial diseases than that

afforded by a condition well known in the cotton industry in Great Britain, namely, mule spinner's cancer of the scrotum. Clinically this is an epithelioma starting in the skin of the scrotum. In the early stages its progress is slow, but it fairly quickly gives rise to secondary growths, and when it does so is fatal. No claims under the Workmen's Compensation Act in respect of mule spinner's cancer were made until about 1923, but there is no doubt that cases were fairly common in Lancashire certainly before 1900, and that the condition was well recognized by general practitioners practising among cotton operatives. When the present writer was assistant to the late Dr. Sidley of Eccles in 1922, he was shown a series of private case histories which proved that Dr. Sidley had been quite familiar with condition as far back as 1906, and had a very good idea of its cause. There can be little doubt that other practitioners in the area also recognized the condition. But since there was no organized system of sickness recording in general use in England in those days, and as general practitioners are as a rule very shy of writing to the medical press, each man kept his knowledge to himself, and the disease was never described in any of the medical or surgical papers, or in any textbook.

About 1912, a medical student at the Manchester Royal Infirmary, the late S. R. Wilson, was shown by his teachers several cases of cancer of the scrotum which were described as chimney sweep's cancer. Being an alert individual, Wilson noticed that the patients suffering from chimney sweep's cancer did not seem to be chimney sweep's at all, but were almost invariably cotton spinners. He was so impressed by this that he concluded that there must be some connection between cancer of the scrotum and being a cotton spinner. No special notice was taken by the profession at the time, but a few years later, Wilson, together with Mr. A. H. Southam, made much more complete investigations into the condition, concluded that it was caused by the mineral oil used in lubrication of the machinery, and published his findings in the *British Medical Journal*. Since then there has been a great deal of work done in the subject, and it is now proved that Wilson's ideas were correct, and that the cause of mule spinner's cancer is certain carcinogenic substances present in the mineral oil used in the lubrication of spinning mules. Work is still proceeding in order to ascertain the best method of eliminating these substances from the oil used, with very considerable success. That is, of course, where the expert, or rather the team of experts, comes in, but the fact remains that the original discovery of the connection between cotton spinning and cancer of the scrotum was made by general practitioners and a medical student, and would have been described in the literature perhaps twenty years earlier than it was had there been some method of recording and classifying sickness in general use in England at the time.

Mule spinner's cancer also provides very strong support for regular systematic examination of workmen apart from actual sickness. Clinically, it is practically never seen in men who have been engaged in the industry for less than twenty years. Moreover, it is very amenable to treatment in the earliest stages, one application of radium often resulting in complete cure. It is, therefore, apparent that if examination of cotton spinners who had been engaged in spinning for over twenty years were carried out at regular intervals, say every six months, the disability and mortality from the disease could be reduced to negligible proportions. Mule spinner's cancer has already cost the cotton industry in Great Britain over 20 lakhs of rupees in compensation for deaths alone, in addition to a large sum in compensation for disability arising from the disease. Quite apart from the tragic loss of life, most of this money could have been saved by regular examination of operatives, which would not have required the services of specialists, but could quite easily have been carried out by ordinary medical practitioners, provided proper records of their examinations were maintained. The moral for Indian industrialists is clear.

India is at the commencement of her industrial and economic development, and is in the fortunate position of being able to profit from the mistakes of other countries where development has taken place earlier. Among the most costly of errors committed in Europe has been neglect of provision of medical services in direct connection with industrial establishments, and of statistical recording and analysis of the work of medical services where they have been established. These errors are easily avoidable. No elaborate administrative machinery is required. The principles are easy to follow and to adopt.

A large number of doctors released from army service who have been accustomed to a high level of professional treatment, and to the keeping of systematic records of various kinds, are now in search of peace-time employment. No more profitable way of utilizing the services of some of these men could be found than by absorbing them in medical schemes in connection with Indian industry.

USE OF CRUDE OIL AND BLEACHING POWDER IN CONTROLLING FLY BREEDING IN COMPOST TRENCHES

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In a large number of municipal towns in India, the methods of disposal of town wastes

like night soil and *katchra* are highly insanitary and wasteful. The *katchra* dumping grounds and the night soil trenching grounds have often proved to be dangerous sources of fly breeding. For some years now, the compost method has been recommended as a satisfactory system of disposal of town refuse. It has proved to be of higher sanitary standard and has been responsible for better utilization of the wastes as manure.

Since the inception of the Compost Scheme (August 1943) as an activity of the Food Production Drive in this country, the insanitary old methods of disposal have been replaced by the Bangalore Method of Composting Refuse in more than 300 municipal centres. The public health authorities of most of these centres have now been convinced of its sanitary superiority over the old methods. In view of certain criticism, however, in regard to the efficacy of the method in mitigating fly nuisance, a critical investigation on this aspect was undertaken and an account of some observations (Joshi and Dnyansagar, 1945) has been already published in this journal.

It was observed that the number of fly maggots and pupæ in compost trenches is very low during winter and summer months and that the maximum temperature developed in the compost mass within first week after processing was more than 65°C. which was considered lethal for fly eggs, maggots and pupæ. Ordinarily hence compost method of disposal of refuse can be considered effective enough in controlling fly breeding during winter and summer months; during the rainy season, however, considerable variation in the temperatures occurred and the maximum temperature usually did not exceed 45°C. The low temperatures of compost mass and the humid atmospheric conditions do not check fly breeding effectively. Our observations, however, showed that only 10 to 20 per cent of the pupæ in the compost trenches could reach the fly stage, showing thereby that composting could minimize fly breeding to that extent.

The necessity of employing some specific measure to control the small amount of fly breeding that occurred in rainy season was thus seen. Such a measure should be workable under conditions existing in the rainy season. Another important consideration is the cost. The compost manure is generally sold at a cheap rate of 8 to 12 annas per cart load. Since the municipal committees expect the compost depots to be at least financially self-supporting, there is very little margin for adopting any costly method of controlling fly breeding.

Various methods for fly control are known, e.g. employing fly papers, fly traps, chemical sprays, thermal methods such as Fay's (1936), electric screens, earth plasters as suggested by Issac (1944), etc. Acharya and Rao (1945) have recently suggested the tarred hessian cloth method which is a modification of Issac's plaster

method. In actual working, however, considerable difficulties have been experienced for its successful practical application. The tarring of cloth, covering the trench up to a particular period, etc., require much close supervision which is generally lacking in the municipal centres. The method is unwieldy. The need of developing some other simple practicable method for control of fly breeding in compost trenches which could be smoothly operated in various municipal centres was hence felt.

Experimental

Two common insecticides, viz, crude oil and bleaching powder, which are generally stocked by the municipal committees, were employed for the purpose of destroying fly eggs, maggots and pupæ.

In the first place effect of these insecticides was studied on maggots and pupæ in petri dishes. It was observed that almost instantaneous death resulted.

Large-scale trials on compost trenches were conducted thereafter in trenches $5 \times 4 \times 2$ feet which were filled in with 850 pounds of *katchra* and 60 gallons of night soil as per compost technique. Mosquito nets raised properly over the trenches were used as fly traps. Fly counts were taken every day till there was no further emergence of flies.

The average temperature of the compost mass and the count of adult flies that emerged from day to day (an average of four replications) are given in table I. No treatment was given, this

TABLE I

Showing average temperature of compost mass and count of fly emergence in compost trench of $5 \times 5 \times 2$ feet

Day after filling of trench with refuse by compost technique	Average temperature, °C.	Flies emerged
2	40	Nil
3	40	Nil
4	40	8
5	45	16
6	45	20
7	45	22
8	46	27
9	45	43
10	45	160
11	45	251
12	42	312
13	42	317
14	42	121
15	43	70
16	40	40
17	35	25
18	35	2
19	35	Nil
Total emergence ..		1,434
Emergence per sq. ft. ..		71.7 or 72

being the control trench. Average temperature was taken by introducing a thermometer in the compost mass to a depth of 9 inches and recording temperature at two spots and striking an average of 8 such observations (in four trenches under each treatment).

The above results indicate that a temperature of 45°C. is not effective in killing all the maggots and eggs. Considering that *katchra* and night soil during the rainy season are very highly infested with fly maggots, an emergence of 72 flies per square foot is not very high. The processing of refuse by the compost technique is responsible for checking fly breeding to some extent. The highest fly emergence has occurred from 10th to 14th days.

Along with the above trial using the same refuse in the same quantity, treatment with crude oil and bleaching powder was tried. The rate of application of crude oil was at the rate of 1 gallon per 100 square foot area. It was emulsified in three times the quantity of water and sprinkled on the first day over the surface *katchra* of the compost trench. The rate of application of bleaching powder was 10 lb. dissolved in 5 gallons of water per 100 square foot area. It was also sprinkled on the first day of filling refuse in trenches on the top *katchra* layer. The average temperature and emergence of flies in these treatments are given in tables II and III

TABLE II

Showing average temperature and fly emergence after crude oil treatment of compost trench of $5 \times 5 \times 2$ feet

Day after filling of trench with refuse	Temperature, °C.	Number of flies emerged
2	40	Nil
3	40	Nil
4	43	4
5	43	8
6	43	15
7	44	13
8	44	27
9	44	26
10	43	43
11	41	81
12	42	90
13	42	70
14	41	40
15	40	35
16	36	27
17	35	18
18	35	11
19	34	13
20	34	5
21	34	Nil
Total emergence ..		525
Emergence per sq. ft. ..		26.2 or 26

respectively for crude oil and bleaching powder treatments.

TABLE III

Showing average temperature and fly emergence after bleaching powder treatment of compost trench of $5 \times 5 \times 2$ feet

Day after filling of trench with refuse	Temperature, °C.	Number of flies emerged
2	36	Nil
3	40	1
4	43	Nil
5	45	3
6	43	2
7	41	5
8	39	16
9	39	21
10	40	18
11	40	108
12	40	112
13	37	60
14	37	50
15	37	23
16	36	21
17	37	20
18	37	16
19	30	5
20	35	3
21	35	Nil
Total emergence ..		484
Emergence per sq. ft. ..		24.2 or 24

It is thus seen that as against a fly emergence of 72 per square foot in the compost trenches not receiving any special treatment, the emergence in trenches treated with crude oil at the rate of 1 gallon per 100 square foot and bleaching powder at the rate of 10 lb. per square foot has been lowered to 26 and 24 per square foot respectively. Thus by this simple measure the fly breeding in compost trenches in the rainy season has been reduced by about 65 per cent. It is observed that the temperature of compost mass is not much affected by these treatments and the highest emergence of flies as in the untreated trenches was from the 10th to 14th day.

Double application of insecticides.—The high fly emergence begins on the 10th day after processing of refuse in the trenches. It was, therefore, thought that an additional application of crude oil and bleaching powder on the 8th day would be more effective in controlling fly breeding.

The application of the insecticides was hence done as follows :—

(i) *Crude oil.*— $\frac{3}{4}$ gallon per 100 square foot each time on the 1st and the 8th day after processing of refuse.

(ii) *Bleaching powder.*—6 lb. per 100 square foot each time on the 1st and the 8th day.

The temperature and fly emergence were recorded. The temperatures did not vary much from what was noted in the previous case. The number of flies emerged is given in table IV.

TABLE IV

Showing number of flies emerged in compost trench of $5 \times 5 \times 2$ feet after double treatment with crude oil and bleaching powder on the 1st and 8th day

Day after filling refuse in trench	NUMBER OF FLIES EMERGED	
	Double application of crude oil	Double application of bleaching powder
2	Nil	Nil
3	5	Nil
4	7	4
5	12	6
6	40	20
7	38	11
8	33	5
9	2	14
10	7	10
11	8	15
12	12	20
13	6	18
14	Nil	16
15	Nil	13
16	..	8
17	..	Nil
Total emergence		170
Emergence per sq. ft.		8.5 or 9
		8.0

The double application of both crude oil and bleaching powder on the 1st and the 8th day is very effective in checking fly breeding and lowers it to about 11 per cent as compared to untreated control compost trenches. Our observations published in a previous article in this journal (Joshi and Dnyansagar, 1945) show that the count of maggots and pupæ per square foot in compost trenches in summer months is of the order of 140 out of which emergence of flies might be less than 5 per cent. It could hence be concluded that by double application of either crude oil or bleaching powder the fly breeding in compost trenches in the rainy season can be reduced to the summer level. And the performance of these insecticides can be considered very efficacious.

It was further observed that the application of these insecticides did not interfere in the biochemical decomposition of the manure which ripened in the usual period of 4 to 6 months.

Instructions in regard to use of the chemicals on routine basis.—The following routine method for controlling fly breeding in compost trenches for the rainy season is suggested.

When a trench is completely filled with refuse as specified in the Bangalore method, half to three-fourth gallon of crude oil or 6 to 7 pounds of bleaching powder per 100 square foot diluted with necessary quantity of water is sprinkled on the whole of the top of the *katchra*, taking care that the sides of the trenches are also carefully treated with the mixture. The operation of applying crude oil is best performed by means of a broom, which is always available on the compost depot. The mixture of crude oil or bleaching powder in water can be prepared in an enamel or iron basin. The same operation is repeated on the 7th or 8th day, i.e. one week after complete processing of refuse. It is generally experienced that bleaching powder does not keep well on storage during the rainy season. Much of its chlorine is lost and the insecticide does not retain its germicidal power. The crude oil treatment is therefore preferred to the bleaching powder. The former is also more economic.

Economics of the treatment.—For a trench of $20 \times 6 \times 3$ feet which would yield five tons of manure, about $1\frac{1}{2}$ gallons of crude oil or 17 pounds of bleaching powder would be required (for two applications as recommended). The cost of these chemicals would be Re. 0-15-0 for crude oil (Re. 0-9-0 per gallon) and Rs. 2-2-0 for bleaching powder (Re. 0-2-0 per pound). Thus the additional cost per ton of manure comes to annas 3 per ton for crude oil and annas 7 per ton for bleaching powder. The insecticides would be used only during the three rainy months of July, August and September, and therefore when the cost of treatment is spread over the whole year's production of manure, it would be very meagre and could be easily recovered from sale proceeds of the manure.

Summary

The use of crude oil and bleaching powder has been observed to be very effective in controlling fly breeding in compost trenches during the monsoon. An application of $1\frac{1}{2}$ pounds of crude oil and 12 pounds of bleaching powder per 100 square feet (in two doses, first one on the 1st day after filling of refuse and second on the 8th day) is recommended. Fly breeding is controlled to the extent of 85 to 90 per cent. The method is very practicable and cheap. Crude oil treatment is preferred to bleaching powder, as the latter deteriorates readily on storage in the monsoon. The former is also cheaper.

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ROLE OF FIELD RATS IN THE ENDEMICITY OF PLAGUE IN H.E.H. THE NIZAM'S DOMINIONS

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Introduction and the problem.—Experience of the pandemics of plague shows that at the height of the pandemic many countries which have remained free from plague for a long time are involved, but as the force of the pandemic diminishes plague recedes to certain areas from which it originally started. During the course of this recession, these pandemics leave behind certain endemic centres where the disease smoulders for longer periods due to the more or less suitable conditions prevailing there and, now and then, under more favourable circumstances, shows signs of spreading to the neighbouring areas.

From the recent history as well as from the past records of plague in India, it appears that there are certain such endemic zones of plague here also. The first of these and probably the oldest known is the zone containing certain areas in the sub-montane region of the Himalayas. A second centre appears also to be present in the hilly districts of the Central India plateau and a third in Southern India in the western part of the Mysore State including the districts of Nilgiris, Salem, Coimbatore and Madura in the Madras Presidency. A fourth endemic centre in the plains with which the author is more familiar consists of the districts of Osmanabad, Bidar, parts of Bhir, Gulberga, Atraf-e-Balda and Mahboobnagar in H.E.H. the Nizam's Dominions and the adjoining districts of the Bombay Presidency, viz, Belgaum, Dharwar, Sholapur and Satara.

It will be clear from the above facts that plague in an endemic form has disappeared from a large part of H.E.H. the Nizam's Dominions where it was previously prevalent. However, in some parts the epidemics are still an annual feature and under more favourable circumstances these epidemics sweep over some of the neighbouring districts which have been free from plague for a certain number of years previously.

It is not clear still why certain areas remain as endemic zones of plague while others having similar sanitary environments have got rid of the infection. Connected closely with this epidemiological problem there is another: Where and in what form does the plague infection lurk in an endemic village or town when there are no human cases there or an apparent epizootic?

Considering the lower temperature in the deeper rat-burrows and plenty of food available in the fields, particularly in those localities where groundnut crops are raised, it was thought not improbable that, continuously or at least during the off season, plague epizootics might be

going on among these field rats, and with the onset of the monsoon when some of the burrows in the fields get flooded, these rats might get in contact with the village rats and start a plague epizootic and subsequently an epidemic among the human beings in the village.

As a direct search among the field rats for plague infection particularly in its chronic or attenuated form would be difficult and involve extensive field laboratory arrangements and technique, an indirect approach to the question was decided upon, by treating not individual rat but the whole herd as a unit and by studying the results of the experiment as a mass phenomenon.

If we find on experimentation that rats from the fields surrounding the village are highly resistant to experimental plague infection, all other things being equal and comparable, we may conclude that some form of infection from *Pasteurella pestis* or allied group of organisms is prevalent among the experimented group of field rats which is giving them this amount of resistance to plague infection. On the other hand, if these field rats prove to be highly or more susceptible to plague infection, we may conclude that no plague epizootics have been prevalent for a long time among this group of rats.

To carry out these experiments the village Hassegaon was selected. The village is situated 18° 19' N. and 76° 38' E. and is about 8 miles from Latur, a big trading centre in Osmanabad district. The village is in the middle of the so-called endemic zone and has a population of 1,143 and 319 houses. It has no direct road or rail communication with any of the neighbouring towns but a rough cart tract connects it

zone from the limits of the first zone to the 3rd furlong from the margins of the village. The third zone included all the fields belonging to the village outside the second zone.

Rats were collected from the village and from each of these zones separately. All the rats trapped from the village were *Rattus rattus* and rats caught in the three field zones belonged to the species *Tatera indica*. They were all quarantined for a period of 10 days in specially prepared animal rooms in the compound of the Infectious Diseases Hospital, Latur, and then carried to the Haffkine Institute, Bombay.

All the rats were transported to Bombay at the same time so that the environmental conditions for all the rats remained the same throughout. The food given to all the rats was the same both in Latur and in Bombay. At the Haffkine Institute a rest of 3 days was allowed so that the effects of the railway journey might pass off and the normal conditions obtained again as far as possible. A day previous to the actual testing all rats to be tested were isolated, each rat in a separate cage labelled with the number, species and locality and the zone to which the rat belonged. The standardized infective dose containing a practically constant number of organisms prepared in the Haffkine Institute as described by Sokhey (1936) was used in all the tests. Each infective dose used for these rats contained 450 to 500 *Past. pestis* organisms.

All the rats were inoculated on 22nd May, 1944, and they were kept under observation for a period of 16 days from the date of inoculation. All the rats that died during this period were autopsied, post-mortem signs noted, smears

Summary of the results of the experiments

Species of the rats tested	Locality from which the rats were obtained	Number inoculated with the standard test dose	Number of rats that died of plague	Number dying from causes other than plague	Number that survived the period of observation
<i>Rattus rattus</i> ..	Hassegaon village	22	12	3	7
<i>Tatera indica</i> ..	Fields, 1st zone	40	37	2	1
<i>Tatera indica</i> ..	Fields, 2nd zone	50	47	..	3
<i>Tatera indica</i> ..	Fields, 3rd zone	30	27	..	3
Total <i>Tatera indica</i> ..		120	111	2	7
Control rats					
<i>Rattus rattus</i> ..	Bombay City	10	1	..	9
<i>Rattus norvegicus</i>	Do.	10	2	..	8
<i>Gunomys varius</i>	Do.	10	10	..	..

with Latur. The village has been experiencing plague epidemics every year for the last 8 years and every 3 or 4 years for 20 years prior to that.

Methods adopted.—The fields around the village were divided roughly into three zones, the first zone extending from the margin of the village for about 1½ furlongs and the second

from spleen, heart blood and glands examined microscopically, and cause of death ascertained. All those that survived this period were killed and similarly autopsied and results noted. The table gives the summary of the results of these experiments while the statement shown as Appendix 'A' gives the same results in greater details.

The rats from the village (*R. rattus*) showed a high order of resistance to plague infection, 31.8 per cent of them surviving the observation period, while 92.5 per cent of the field rats (*T. indica*) succumbed to infection, showing extreme susceptibility to plague infection, the susceptibility in all the rats from the three zones being almost of the same order.

The resistance showed by the village rats from Hassegaon is of the same order as experienced in other towns having a similar plague history (Sokhey, 1936). Similarly the control rats from the Bombay City showed the same order of resistance as was experienced in several previous experiments carried out at the Haffkine Institute, *Gunomys varius* being highly susceptible and *Rattus rattus* and *Rattus norvegicus* being equally resistant to plague infection.

Discussion

The Indian Plague Research Commission first showed in 1911 that while rats from Madras City, which has been altogether free from epizootic plague, were highly susceptible to a small infecting dose of plague bacilli, rats from other plague-infected towns such as Poona and Bombay exhibited a comparatively high resistance to the same infective dose. Workers in the Haffkine Institute, Bombay, have repeatedly confirmed these findings. In fact, till recently they regularly made use of the high susceptibility of Madras rats for purposes of testing the potency of their plague vaccine and sera.

As to the reason why the resistance of the rats obtained from the areas which were subject to plague epidemic should be higher than that of the rodents from a plague-free area, the Plague Research Commission put forward two possibilities, namely:—

1. That the resistance was acquired as a result of a sub-clinical infection.
2. That it was due to the elimination of highly susceptible strains.

Without arriving at a definite conclusion they rather favoured the latter possibility.

It must, however, be remembered that in the tests carried out in this connection by the Plague Commissioners as well as by other workers the infecting test dose of *Past. pestis* used was such that could not be accurately estimated in regard to the number of organisms or to their virulence.

Again in the case of rats the resistance may be due to an inherent character of the species itself or it may depend upon the place difference for a given species of rats. Our previous experience has shown that acquired immunity cannot entirely be ruled out at least in the case of *Rattus rattus*. At any rate this immunity varies according to the plague history of the place. However, since there is species difference in immunity for rats of the same place as seen by the results of tests on control rats from the City of Bombay (*R. rattus* and *R. norvegicus* are highly resistant and *G. varius*

is extremely susceptible to plague infection), this cannot explain everything.

Our experiments have shown that rats from the fields around the village Hassegaon are extremely susceptible to plague infection. This fact shows that these rodents have not come in contact with plague infection within recent years so as to give rise to the suspicion of their being the cause of the plague endemicity in this area. If these rats had come in contact with plague infection, the rats would have been found more resistant to plague either due to some of them having acquired this resistance by means of sub-clinical doses of infection or the more susceptible strains among them having succumbed to infection leaving only the resistant strains behind.

In view of the fact that intensive fumigation of rat-burrows to eradicate plague infection from the endemic areas is being considered seriously in many places, the question of particular areas to be so dealt with becomes of great importance. If it could be shown that field rats come in contact with plague infection more frequently, not only the rat-burrows in the villages themselves, but those in the fields surrounding the villages also require thorough fumigation. This task becomes enormous and from a financial point of view almost prohibitive. However, our experiments show that, at least as far as Latur area is concerned, we are justified in thinking that field rats do not play any rôle in keeping this area as an endemic plague zone, but it is the village rats and the conditions prevailing in the villages that are chiefly responsible for the persistence of this endemicity. Consequently there is a strong hope that an intensive and frequent fumigation of rat holes in the villages themselves in the affected area will be able to clear the infection much earlier than it might happen in the natural course of events.

Summary and conclusions

From a village in an endemic zone of plague in H.E.H. the Nizam's Dominions rats were collected both from the village as well as from the fields surrounding the village.

All rats caught from the village belonged to the species *Rattus rattus*, while the rats from fields were all of the species *Tatera indica*.

Inoculating all these rats with a standardized dose of plague infection, all field rats showed extreme susceptibility to plague, 92.5 per cent of these dying from acute plague infection; the rats from the village proper showed a fair amount of resistance to plague infection, as nearly 32 per cent of the animals inoculated survived.

It is argued that the fact of the field rats in this area being highly susceptible to plague infection, indicates that these have not been in frequent contact with plague infection and as such could not be the cause of endemicity of plague in this area.

Appendix 'A'

Results of experiments carried out to test the resistance to plague infection from Hassegaon village and its surrounding fields together with rats from Bombay to serve as control

Serial number	Species of the rats tested	Locality	Total number of rats tested	Rats that died of cause other than plague	NUMBER OF RATS THAT DIED OF PLAGUE ON DIFFERENT DAYS AFTER INOCULATION													Total deaths from plague	Number of survivals	
					1st day	2nd day	3rd day	4th day	5th day	6th day	7th day	8th day	9th day	10th day	11th day	12th day	13th day			14th day
1	<i>Rattus rattus</i> from Hassegaon village.	Hassegaon village	25	3	..	2	3	3	4	3	4	15	7
2	<i>Tatera indica</i>	From the Hassegaon fields, 1st zone.	40	1	..	..	8	11	4	4	4	3	..	..	..	2	..	3	37	2
3	<i>Tatera indica</i>	From the Hassegaon fields, 2nd zone.	50	..	..	..	21	18	5	3	3	..	..	..	..	..	..	..	47	3
4	<i>Tatera indica</i>	From the Hassegaon fields, 3rd zone.	30	..	..	..	11	10	2	2	2	1	..	..	..	..	..	..	27	3
5	<i>Rattus rattus</i>	Bombay City	10	..	..	..	..	1	1	1	..	..	..	..	..	..	..	..	1	9
6	<i>Rattus norvegicus</i>	Do.	10	..	..	..	..	1	2	..	2	..	..	..	..	..	..	2	2	8
7	<i>Gunomys varus</i>	Do.	10	..	..	..	..	1	1	..	2	1	..	..	..	..	..	10	..	..

To eradicate plague from the endemic zones it is suggested that intensive and frequent fumigations of rat holes in the villages alone gives a fairly good chance.

I thank the Director, Medical and Public Health Department of H.E.H. the Nizam's Government for giving me the facilities for carrying out this work, Colonel S. S. Sokhey, Director, Haffkine Institute, Parel, Bombay, for allowing me to carry out the immunity tests in the Institute, and Dr. M. Shariff of the Haffkine Institute for the identification of the field rats.

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DEVELOPMENT OF HEALTH EDUCATION WORK IN THE UNITED PROVINCES

By A. HAMID, M.B.E., B.S.C., M.B., B.S., D.P.H.
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No apology is needed for writing once more under the above title, as the two previous articles under the title were written before the war (*I.M.G.*, December 1934 and October 1937) and this brief one is intended to link up the past with post-war developments with regard to school medical work.

It has been observed that the finer faculties last to develop are most vulnerable and are liable to disappear first under the effect of major shocks. On this analogy the catastrophe of the war should have affected our programme of school medical work which had already assumed a specialized form in the programme of health education in this province. The war gave us a rude shock as our technical staff was depleted while the skeleton staff had a strenuous time in co-ordinating with the military stations in their anti-epidemic measures and co-operating in their welfare and other activities, such as the War Services Exhibition which was a great show, and the many other smaller, but none the less important, antimalaria exhibitions that were held throughout the province.

But the school medical work continued unabated. The number of towns with a school clinic serving as the centre for the follow-up of defective school children had arisen from five to thirteen just before the war began, all of which have continued to function, and the number of parents and guardians, who have accompanied their wards to the clinics handful at first, has progressively increased very appreciably.

It may be a bold statement that the nutritional condition of school children as judged by the height and weight records has improved under the stress of war. At any rate, the records of average height and weight of school boys, taken

during the last two years of the war, on the whole, show some improvement on those of 1937. And this would not be controverted when it is kept in mind that the records are for that class of population which lives in urban areas and can afford secondary education, so that it could, at the expense of clothing and other amenities, somehow afford meals that, devoid of all extras, become more or less 'square', and thus its diet was less ill-balanced. The current

TABLE I

Average height and weight at various ages of school boys in the United Provinces (1944-45)

Age in years	Height in inches	Weight in lb.
6	44.5	45.75
7	48.25	50.25
8	49.75	52.25
9	51.5	55.75
10	53.5	60.0
11	55.25	64.75
12	56.75	71.0
13	58.5	79.5
14	60.5	86.75
15	62.75	94.5
16	63.0	100.25
17	65.25	103.25
18	65.75	110.5

TABLE II

Normal weights for various heights of school boys in the United Provinces (1944-45)

Height in inches	Weight in lb.	Height in inches	Weight in lb.
36.0	37.5	55.5	65.75
36.5 to 37.0	38.0	56.0	68.25
37.5 to 38.0	39.25	56.5	70.5
38.5 to 39.0	40.5	57.0	72.0
39.5 to 40.0	42.0	57.5	74.25
40.5 to 41.0	42.5	58.0	76.75
41.5 to 42.0	43.5	58.5	77.0
42.5 to 43.0	43.75	59.0	80.0
43.5 to 44.0	44.0	59.5	80.75
44.5 to 45.0	44.5	60.0	84.0
45.5 to 46.0	45.5	60.5 to 61.0	88.25
46.5	46.5	61.5	89.25
47.0	47.75	62.0	90.75
47.5	48.5	62.5	91.5
48.0	49.0	63.0	95.25
48.5	50.75	63.5	97.0
49.0 to 49.5	51.5	64.0 to 64.5	100.5
50.0 to 50.5	51.75	65.0	101.0
51.0	55.0	65.5	104.75
51.5	56.0	66.0	106.5
52.0	57.25	66.5 to 67.0	108.5
52.5	59.0	67.5	111.5
53.0 to 53.5	60.5	68.0	112.5
54.0	63.25	68.5 to 69.0	115.5
54.5	63.5	69.5	117.0
55.0	64.5	70.0	118.75

averages of height and weight for various ages of this class of school-going population are given in table I. We have gone one step further, and have worked out the normal weights for

various heights irrespective of age, as given in table II, as the heights of growing children for the same age vary considerably, and the height factor cannot be ignored in assessing the health of school children. The use of the tables is illustrated by the following example:—

Suppose the age of a boy under examination is 13 years, and he is found to be 58.0 inches in height. The average weight of boys at this age is 79.5 lb. (table I). The average height at this age being 58.5 inches (table I), this boy, although $\frac{1}{2}$ inch below the average for the age, should be considered to be within the range of normal health if his weight is not below 76.75 lb. which is the average weight for boys of 58.0 inches height (table II).

The utility of these tables will be realized after the school health officer has worked on them for sometime, giving due consideration to other factors, besides height and weight, in making an assessment of the nutritional conditions of school children.

Table III shows at a glance the comparative figures for average weights and heights at various ages of boys in the United Provinces at both stages, 1937 and 1944-45, and in Britain and America. The United Provinces figures for heights are not the lowest, but for weights they are, although the weights for 1944-45 show some improvement over those for 1937. Table IV gives the comparative weights for different heights in the United Provinces (1944-45) and in America.

The Famine Enquiry Commission in their final report have deplored that for lack of records no conclusion could be drawn whether there has been a deterioration in nutrition and physique of the people in India during recent years, and it is therefore necessary that records be maintained so that any change in the physical development of the population which may occur in the future may be watched. The efforts of the school medical work made in the United Provinces go to meet the point to some extent and it is hoped that with the development of post-war schemes our medical officers would be able to go further.

A side-issue relating to a feature of dispensing medicine which is commonly neglected, brought to light during the war on account of the necessity of a close scrutiny of stocks in school clinics arising due to the scarcity of quinine, may be mentioned here, as the medical profession has seldom the opportunity to see that their patients are sometimes underdosed. This would happen, for example, when the $\frac{1}{4}$ ounce avoirdupois piece of weight is used for the $\frac{1}{4}$ ounce apothecaries weight of the drug in the prescription, and thus about 40 grains less are dispensed per ounce. Few persons realize that by asking for a dram weight of solids they would get from dealers nearly 27 grains, not 60 grains, of the drug; and the bill of charges for an ounce bottle of the drug would be 16 times the price of a dram, while the contents of the ounce bottle



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TABLE III

Age in years	WEIGHT IN LB.				HEIGHT IN INCHES			
	British Association for Advancement of Science	American Child Health Association	Hygiene Publicity Bureau, U. P. (1937)	Hygiene Publicity Bureau, U. P. (1944-45)	British Association for Advancement of Science	American Child Health Association	Hygiene Publicity Bureau, U. P. (1937)	Hygiene Publicity Bureau, U. P. (1944-45)
6	44.5	48	37.0	45.75	44.0	46	43.0	44.5
7	50.0	53	45.0	50.25	46.0	48	46.0	48.25
8	55.0	58	49.5	52.25	47.0	50	48.5	49.75
9	60.5	64	59.5	55.75	49.5	52	53.0	51.5
10	67.5	70	60.0	60.0	52.0	54	54.0	53.5
11	70.0	77	63.5	64.75	53.5	56	55.0	55.25
12	75.5	85	68.5	71.0	55.5	58	57.0	56.75
13	82.5	93	74.5	79.5	58.0	60	57.0	58.5
14	92.0	108	84.5	86.75	59.5	63	59.0	60.5
15	102.5	120	89.0	94.5	62.0	65	60.0	62.75
16	119.5	134	98.5	100.25	64.5	67	62.0	63.0
17	..	141	100.5	103.25	..	68	64.0	65.25
18	..	149	104.0	110.5	..	69	64.5	65.75

TABLE IV

Height in inches	WEIGHT IN LB.	
	Hygiene Publicity Bureau, U. P. (1944-45)	American Child Health Association
36	37.5	..
37	38.0	..
38	39.25	34
39	40.5	35
40	42.0	36
41	42.5	38
42	43.5	39
43	43.75	41
44	44.0	44
45	44.5	46
46	45.5	48
47	47.75	50
48	49.0	53
49	51.5	55
50	51.75	58
51	55.0	61
52	57.25	64
53	60.5	68
54	63.25	71
55	64.5	74
56	68.25	78
57	72.0	82
58	76.75	85
59	80.0	89
60	84.0	94
61	88.25	99
62	90.75	104
63	95.25	111
64	100.5	117
65	101.0	123
66	106.5	129
67	108.5	133
68	112.5	139
69	115.5	144
70	118.75	147

grains each out of the ounce bottle. It should at the same time be noted that the pharmacopœial doses which are in avoirdupois weight are denominated to suit the weighment of drugs by the apothecaries weights. For further details the writer's contribution to the correspondence column in the *I.M.G.*, July 1945, may be consulted.

Current Topics

Penicillin for Latent Syphilis

(From the *British Medical Journal*, ii, 9th November, 1946, p. 720)

A TOTAL dosage of 4,000,000 units is recommended. This may be given by means of intramuscular injections each of 30,000 to 40,000 units three-hourly or of 300,000 units twice in the twenty-four hours. Arsenic and bismuth should be employed as well immediately after completing the course of penicillin; the amounts will depend on the results of blood tests. In any case, it would be wise to have the cerebrospinal fluid tested without delay, and adjust continuation treatment according to the findings.

More Potent Penicillin

(From the *Lancet*, ii, 16th November, 1946, p. 738)

AN American company, the Heyden Chemical Corporation, is now producing white crystalline penicillin which, it is said, can be stored dry for three years without refrigeration. According to a B.U.P. report, the potency of this product is the greatest yet developed commercially.

The Storage of Penicillin Preparations

By K. WINTERBOTTOM

(Abstracted from the *Pharmaceutical Journal*, Vol. 156, 8th June, 1946, p. 366)

SUPPLIES of penicillin are now available for civilian use, and this should mean the handling of its preparations by a far greater number of pharmacists than

would be about 40 grains below the dispensers' expectation of 480 grains, with the result that he would not be able to make 48 doses of 10

hitherto. The methods of dispensing, properties and uses of penicillin and its preparations will be well known to those who have studied the numerous articles. However, it was considered that more definite information as to the length of time that the commoner preparations would remain potent would be of practical value. Several preparations were therefore examined under temperature conditions likely to obtain in the ordinary pharmacy. Determinations were carried out upon ointments, solution, and lozenges of penicillin, and it will be convenient to report upon each type of product separately.

ASSAY

The assay process used for the solutions and lozenges was a turbidimetric method. These determinations were carried out at a slightly later date than those on the ointment, and whereas with the ointment the two methods of assay gave results in close agreement, the turbidimetric method seems to give a far lower percentage error, and was chosen for the latter determinations. Even allowing for the margin of error, an occasional obviously high result has been obtained.

OINTMENT

It was decided to carry out the determinations of the ointment at three different storage temperatures, 0°-4°C., 15°C., and 25°C. The first, of course, is that of the refrigerator, 15°C. can be considered to obtain in a cool cellar and 25°C. represents summer heat in the shop.

The ointments used were prepared with the normal 30 per cent Lanette wax SX base. The containers were bakelite-capped jars, the caps being lined with rubber washers, the latter separated from the ointment by a layer of cellophane on the underside. The amount of ointment contained in each jar was 15 gm., and five samples assayed immediately after preparation showed an average figure for penicillin content of 170 units per gm. (calculated). Samples were taken for assay at what were considered suitable intervals, weekly, fortnightly and monthly.

Samples of ointment were also spread on open glass trays, at room temperature, and assayed after 6, 12 and 24 hourly intervals. It was thought that this might give a rough indication of the degree of destruction of penicillin in ointment used upon some exposed part of the body, by airborne and other organisms.

Conclusions.—As will be seen, the percentage loss in the ointment on the open trays is surprisingly slight, being less than 10 per cent in the 24 hours. However, one must conclude that no temperature above that of the refrigerator can be considered suitable for storing the ointment for any but the shortest periods, and even under low temperature conditions there is apparently rapid loss.

SOLUTIONS

The solutions examined were of two strengths:—

(i) A solution of calcium salt containing 2,700 units per mil. and (ii) a dilution of this with saline to give a solution containing 270 units per mil. in sterile physiological saline.

The concentrated calcium salt solution was Seitz filtered, and filled directly into the test containers, using an Ayling filling apparatus, under strictly aseptic conditions. The dilute solutions were similarly prepared by filling into containers holding the previously autoclaved physiological saline solution.

Solutions were stored at the same three temperatures as employed for the ointments. The pH value of the concentrated solution was 6.2, and of the dilute solution, 6.5.

Conclusions.—The diluted saline solutions as prepared have far better keeping properties than the more concentrated solutions, the loss after two weeks being approximately only the same for the dilute solution at 15°C. as for the concentrated solution at 0°C. This of course depends to a great degree upon the impurities present and their concentration. A sterile solution of the strength of the dilute solution employed, can, it appears, be stored at refrigerator temperature

quite safely for two months, and probably for a longer time. Under ordinary conditions of storage, there is apparently little loss in two weeks, and even under fairly warm conditions one week's storage would seem safe. For concentrated solutions, however, the refrigerator is the only safe place, and two weeks would seem to be the safe maximum period.

LOZENGES

The lozenges were prepared under aseptic conditions and dried *in vacuo* over phosphorous pentoxide. The base used was a simple one consisting of glucose with 8 per cent acacia. A lozenge of far more suitable consistency is made with the usual quantities of sucrose, tragacanth, and acacia, but shortage of supplies necessitated using the first formula, and quite a presentable product was obtained. The lozenges were packed into sterile glass tubes which were corked and sealed with cellulose tape. For assay, a lozenge was removed from the tube aseptically, and dissolved in sterile buffer solution.

Conclusions.—This type of lozenge will not remain active for more than two weeks, even when stored in the refrigerator. When storage is below 4°C., there is no loss of potency. Up to four weeks' storage under these conditions the loss was approximately one-third, while at the end of two months the loss was two-thirds of the original potency. At 15°C., the lozenges were almost without activity in two weeks.

B. A. L. as Antidote to Mercury

(From the *Lancet*, ii, 16th November, 1946, p. 738)

According to the British United Press, a two-year-old boy in Los Angeles who swallowed three tablets of bichloride of mercury has recovered completely owing to the administration of British anti-lewisite.

The Treatment of Asthma with Rectal Suppositories of Aminophylline and Sodium Pentobarbital

By S. J. PRIGAL *et al.*

(Abstracted from the *Journal of Allergy*, Vol. 17, May 1946, p. 172)

1. AMINOPHYLLINE suppositories gave relief to 38 of 47 patients (80.8 per cent) during an attack of asthma. Aminophylline in combination with pentobarbital sodium was more effective, relieving 44 of 47 patients (93.5 per cent).

2. Where the asthma responded to the suppository, it required about one-half the time with the combination, in most cases, as compared with plain aminophylline.

3. The combination of aminophylline and pentobarbital sodium helped 44 of 47 patients (93.5 per cent) in reducing the frequency and severity of attacks. Aminophylline alone was helpful in 25 of 45 patients (55.5 per cent). The suppositories were given twice daily.

4. No untoward reactions to the suppositories were observed in this series. Some complaints, such as itching, burning or diarrhoea, were reported. Most of these complaints were relieved by lubricating the suppositories with nupercainal ointment.

5. The suppositories may be helpful in the treatment of infants and children due to convenience of administration and rapid action.

6. The suppositories of aminophylline and pentobarbital sodium are effective in mild and moderate cases of asthma. A patient with a severe attack must be given the aminophylline intravenously.

7. Three cardiac patients in this series responded well, probably because of the beneficial effects of aminophylline on the coronaries and due to its diuretic action.

Benzhydryl Ether Hydrochloride (Benadryl) in the Symptomatic Treatment of Allergy

By E. SCHWARTZ

and

L. LEVIN

(Abstracted from the *New York State Journal of Medicine*, Vol. 46, 1st June, 1946, p. 1233)

1. A group of 50 patients with various forms of allergy were treated with Benadryl.

2. Symptomatic relief occurred in 8 of 20 cases (40 per cent) of asthma; in 6 of 10 cases (60 per cent) of vasomotor rhinitis; in 4 of 5 cases (80 per cent) of chronic urticaria; in 8 of 8 cases (100 per cent) of acute urticaria; and in 3 of 7 cases (43 per cent) of miscellaneous allergies.

3. The majority of the patients who obtained relief from Benadryl reported benefit within one hour after administration. Symptomatic relief was palliative.

4. Side reactions occurred in 30 patients, or 60 per cent of the entire group. In 26 patients the side reactions disappeared gradually even while continuing the drug on the initial dosage schedule of 50 mg. every four hours. Four patients stopped the use of Benadryl because of severe side reactions.

5. It is concluded that Benadryl was an effective drug in the symptomatic relief in 29 of the 50 (58 per cent) allergic patients.

New Mercurial Antiseptic

(From the *Pharmaceutical Journal*, Vol. 156, 29th June, 1946, p. 416)

An organic mercury compound, 2-acetoxy-mercuri-4-diisobutylphenol, known under the trade name 'Merbak', has been tested for bactericidal activity by Heinemann and Blanchard (*J. Amer. Pharm. Assoc.*, 1946, 35, 54). It was found to be active against *S. aureus*, *E. typhosa*, *E. coli str. haemolyticus* and *Dip. pneumoniae* in concentrations which varied from 1 in 10,000 to 1 in 30,000 (*Dip. pneumoniae*), against *Ps. aeruginosa*, 1 in 3,000, all at 20°C. It was active in serum broths. Moreover, it proved to be fungicidal against *Tr. rosaceum* in a dilution of 1 in 1,000, and inhibited the growth of this fungus in a dilution of 1 in 30,000. Its toxicity to rats and chick embryos is said to be low, and it is claimed to be non-irritating to the skin.

A New Antimalarial

(From the *Pharmaceutical Journal*, Vol. 156, 29th June, 1946, p. 416)

For the past two years the U.S. Board for the Coordination of Malarial Studies have been examining the effects of a new antimalarial SN 7618 on animals and man. Their report now published (*J. Amer. Med. Assoc.*, 1946, 130, 1069), shows that chemically the substance is 7-chloro-4-(4-diethyl-amino-1-methyl butyl-acino) quinoline. It was found that SN 7618 is highly active against the erythrocytic forms of *P. vivax* and *Plasmodium falciparum* but will not prevent relapse. Its activity is said to be approximately three times that of mepacrine. In suppressive therapy a dose of 0.3 gm. given on the same day in each week is recommended; in the treatment of an acute attack an initial dose of 0.6 gm. is followed by 0.3 gm. after six to eight hours and a single dose of 0.3 gm. on each of two consecutive days.

Bacitracin : A New Antibiotic

(From the *Pharmaceutical Journal*, Vol. 156, 29th June, 1946, p. 416)

A NEW antibiotic, 'Bacitracin', has been produced from the strain of the *B. subtilis* group of organisms by B. A. Johnson, H. Anker and F. L. Meleney (*Science*,

1945, 102, 376). *In vitro*, it is chiefly active against gram-positive organisms, but it also inhibits the growth of gonococci and meningococci. It is effective against haemolytic streptococcal infections in mice and against gas gangrene infections in guinea-pigs. 'Bacitracin' is a neutral, water soluble, non-toxic substance; it is relatively heat-stable, as no significant loss of activity was noted after heating at 100°C. for 15 minutes. When tested against gas-gangrene organisms using guinea-pigs, 80 per cent of the animals were alive and well two weeks later, whereas all the control animals were dead within 12 hours. It has also been shown to be effective against haemolytic streptococci in mice. Used locally in a small number of human cases against staphylococci and haemolytic streptococci, 'Bacitracin' gave satisfactory responses comparable to the action of penicillin.

A Sermon in Wood

(Abstracted from the *Canadian Medical Association Journal*, Vol. 55, July 1946, p. 79)

THERE is a door in the Hamilton (Canada) Museum from an old house in that city. The old house, demolished in 1894, had been the residence of a doctor Case for so many years—and of his father and grandfather—that the door in question had become worn in a fashion which to Sir William Osler, an old friend of the Case family and one who always called to pay his respects when in that part of Canada, was a sermon in wood, so to speak. Sir William wrote an editorial about this symbolic door with the title of 'Doctors' Signs' which was published in the *Canadian Medical and Surgical Journal* (12, 312, December 1883). This is what he said about the door's symbolism:

'Happy is the man whose reputation is such or whose local habitation is so well known that he needs no sign! This is sometimes the case in country places and small towns, not often in cities. We know of one such in a prosperous Canadian city. Grandfather, father and son have been in "the old stand" so long that to the inhabitants of the locality the doctor's house is amongst the things which have always been. The patients' entrance is in a side street and a small porch protects the visitor. The steps are well worn and the native grain is everywhere visible in the wooden surroundings. There is neither bell nor knocker and the door presents interesting and, so far as we know, unique evidences that votaries to this Aesculapian shrine have not been lacking. On the panels at different heights are three well-worn places where the knuckles of successive generations of callers have rapped and rapped and rapped. The lowest of the three, about three feet from the floor, represents the work of "tiny Tim" and "little Nell", so often the messengers in poorer families. Higher up and of less extent is a second depression where "Bub" and "Sis" have pounded, and highest of all, in the upper panel a wider area where the firmer fists of the fathers and brothers have as the years rolled on worn away the wood to nearly half its thickness. Such a testimony to the esteem and faithfulness of successive generations of patients is worthy of preservation.'

Basal Body Temperature Graphs as an Index to Ovulation

(From the *Medical Journal of Australia*, Vol. 1, 4th May, 1946, p. 634)

PENDLETON TOMPKINS (*The Journal of the Obstetrics and Gynaecology of the British Empire*, June 1945) advocates the use of daily temperature readings as a method of ascertaining the time of ovulation. He maintains that the basal temperature in women consistently shows a drop followed by a rise about fourteen days before the onset of menstruation. The rise is then maintained until menstruation begins. The author recommends this method as the simplest and most accurate way of timing ovulation for an individual

woman. To obtain a basal temperature reading it is suggested that it be taken *per rectum* in bed before rising each morning. The patient is instructed to keep a chart of the daily readings, noting any intervening conditions, such as sore throat, which may cause a rise in temperature. Using such charts as an index of ovulation, the author was able to predict the time of maximal fertility for those who wish to conceive. Obviously this occurs immediately after the temperature shift takes place. These charts are equally valuable for ascertaining the 'unsafe' period for those who do not use contraceptives, but have no wish to conceive, especially when there is irregularity of periods. When pregnancy supervenes the ovulatory temperature rise is uniformly maintained, so that this observation, coupled with amenorrhoea, is a suggestive sign of early pregnancy—the poor man's Friedman test'. Other uses to which these charts may be put include the evaluation of treatment intended to stimulate ovulation, as an aid in securing biopsies in the pre-ovulatory or post-ovulatory phases of the endometrium, in studying the effectiveness of contraceptives, and as a means of investigating some types of irregular uterine bleeding.

An Experiment in the Rationing of Food

(Abstracted from the *Medical Journal of Australia*, Vol. 2, 27th July, 1946, p. 134)

In September 1939 Professor R. A. McCance informed the Medical Research Council that he proposed with Miss E. M. Widdowson to study the effect on human beings of a diet (a) which might be available under conditions of war and (b) at which the authorities ought to aim as a minimum even if the country was in dire straits as a result of the enemy blockade. The planning of the work 'involved some prophecy as to what might happen with regard to feeding arrangements in the war'. The prophecy tallied fairly closely with reality.

Eight persons were the subject of the experiment. After a preliminary week of taking ordinary food they were subjected to the experimental diets for periods varying from two weeks to three and a half months. During the preliminary period of the experiment and in certain cases during the post-experimental weeks the subjects weighed all the food that they ate, noted how they enjoyed it, what effects it had upon them and whether they felt it. In the preliminary period and during certain of the subsequent weeks six of the subjects collected their excreta for investigation and for chemical analysis. Laboratory tests of nutritional fitness were carried out from time to time on the long-term subjects and towards the end of the experiment field tests consisting of mountaineering and of long-distance cycling were applied. The diet for the experiment consisted of unrationed and of rationed elements. The unrationed foods were potatoes, green and root vegetables and bread made from flour containing 92 per cent of the original wheat and fortified with calcium carbonate. The rationed elements for each week comprised 16 ounces of meat, fish, poultry or rabbit; four ounces of cheese; four ounces of margarine (this was the total fat allowed); five ounces of sugar including jam, marmalade *et cetera*; two ounces of oatmeal; four ounces of rice; ten ounces of pulse; one egg; 35 ounces of whole milk; six ounces of fruit. These amounts were a good deal less than those allowed in the war-time rations. The war-time rations included each week eight ounces of fat, eight ounces of sugar and some jam; from two pints up to unrestricted amounts of milk were allowed with some dried separated milk, the amount of meat was what could be obtained for one shilling and two pence, together with three to six ounces of bacon *plus* unrationed fish, poultry and rabbits. The war-time allowance of cheese was four ounces and later three ounces of cheese. The degree, form and extent of the adaptation to the experimental diet demanded of each

subject varied with the diet to which he had previously been accustomed. All who were tested for three months made satisfactory adjustments; one person whose physical adaptation was good was apprehensive and worried and was regarded as having failed in psychological adaptation. The diets themselves are described as containing quite enough protein, though they were inevitably low in animal protein. They contained very little fat but correspondingly large amounts of carbohydrate, most of which was in the form of starch. The diets provided as much calcium as normal diets; plenty of phosphorus and other minerals and much more vitamin B₁ and vitamin C than most English diets. A study of excretions showed that the urine of each subject contained about the same amounts of magnesium and phosphorus as before. The urine contained less calcium, suggesting that less was absorbed, and this was at first attributed to a vitamin D deficiency, but it was found impossible to alter the urinary faecal ratios by giving moderate doses of calciferol. Once the subjects had adjusted themselves they were satisfied and content; they liked the food, approached it with gusto and did not find it monotonous. The health of the subjects was particularly good all the time that they were living on this restricted dietary, and at the end of three months they were able to take prolonged and severe physical exercise without undue fatigue. The 'inevitable' conclusion was that once an adult had become accustomed to the diet, it was satisfactory for all ordinary purposes.

The result of this investigation must have been surprising to those in war-time Britain who had to do with the food supplies during the stressful days of the war. It was recognized that if restrictions as severe as those of the investigation had to be faced, the problem would be how to effect their introduction and have them accepted by the people. One or two prominent facts and conclusions may be mentioned. First of all, if the food of the people is rationed in certain directions, they will certainly try to keep up their calories from unrationed foods. Again it is pointed out that since the three staples, wholemeal bread, potatoes and green vegetables, were of the greatest value, not only should everything be done to leave them unrationed in a crisis, but rich and poor should alike be able to command them. Perhaps the most important statement in regard to food itself is that for emergency rations only flour containing 92 per cent of the original wheat should be considered. Again if a milk shortage is envisaged at any time, calcium should be added to the bread.

This work is likely to have results in other spheres than those of war. This is shown by the observation that the authors of the report could see no justification for the enormous amounts of meat in the rations of the British soldier; they considered that troops, at least in Britain, would be just as well served with bread made from a lightly milled flour, more potatoes if necessary, and less meat. Had such views been published during the war, they would have received a warm welcome from many civilians, particularly from harassed housewives. This work may also be useful to those who plan food relief for countries affected by the present world food shortage.

Incidence of Leukemia in Radiologists

By U. HELMUTH

(From the *New England Journal of Medicine*, Vol. 234, 10th January, 1946, p. 45. As abstracted in the *International Medical Digest*, Vol. 48, April 1946, p. 199)

'EXPOSURE to x-rays has for some time been regarded as a possible cause of leukemia. This belief is based in part on results obtained by experimental exposure of animals to x-rays and in part on several reports of cases of leukemia occurring in workers exposed to radiation.'

Since the majority of physicians are not subject to exposure to radiation it seems that a comparison of the

incidence of leukemia among radiologists and that among other physicians should give some conclusive results. 'The present report is based on a statistical study of deaths of physicians reported in the Journal of the American Medical Association during the 10-year period 1935 to 1944.

'It must be admitted that the results cannot be perfect, first, because the cause of death is not given in about 25 per cent of the obituary notices, and second, because in an even greater number there is no indication of possible x-ray exposure. For example, some of the physicians not listed as radiologists but dying from leukemia may have been exposed to radiation—the case reported at the end of this article is of this type—which would increase the incidence of leukemia in the exposed group. Conversely, some unexposed physicians, the cause of whose death is not given, may have died of leukemia, which would increase the incidence in this group. It is not unreasonable, therefore, to assume a tendency of the various unknown opposing factors to balance each other. At any rate, if the difference between the two groups is sufficiently large, it should not be significantly affected by these discrepancies.

'From 1935 to 1944, inclusive, the deaths of 34,626 physicians were recorded in the Journal of the American Medical Association. Two hundred and five of these men were listed as radiologists. The total stated number of deaths from leukemia is 158. Eight of these occurred among the 205 radiologists, giving a percentage of 3.9; 150 were among the 34,421 physicians not listed as radiologists, a percentage of 0.44. Therefore, those known to have been exposed to radiation had an incidence of leukemia more than eight times as great as those who are not listed as radiologists. Although this difference may be affected somewhat in either direction by the previously discussed lack of complete information, it seems too great to be wiped out or to be significantly modified.

'This statistical study which supplies substantial evidence that exposure to radiation is a potential cause of leukemia was suggested by the occurrence of this disease in a physician who had repeatedly been exposed to radiation over a long period of time. The following data summarize the findings in this case:—

R. J., a 51-year-old dermatologist, had for several years failed to take precautions against exposure to radiation that he used for treating his patients. Symptomatically his illness began in the fall of 1941, the major complaint consisting of pain in various parts of the body, especially in the chest. It became quite severe during a period of 6 weeks and was aggravated by motion and deep respiration. Slight fever (99.2°F.) was present. The skin was pale and suggested anaemia, which was confirmed by examination of the blood, the red cell count being 2,610,000 and the haemoglobin 45 per cent. Leukopenia was present, the number of leukocytes varying between 1,500 and 5,540 per cu. mm. and the percentage of neutrophils between 4 and 54. The lymphocytes, largely normal in appearance, were the most numerous leukocytes in the majority of smears. At times occasional immature cells of the lymphoblastic type were found. The leukopenic blood picture persisted essentially unchanged for 6 months, when the total number of leukocytes began to increase and reached a maximum of 163,200 within 2 weeks, with a differential count typical of lymphatic leukemia. The patient died on 20th August, 1942, approximately 9 months after the onset of symptoms. Autopsy confirmed the diagnosis of lymphatic leukemia.

'This case is intentionally omitted from the group of 8 cases of leukemia occurring in radiologists, because the notice of this patient's death gave no indication that he had been exposed to radiation. If his case were included in the radiologic group the percentage of leukemic deaths therein would be increased to 4.3, and the percentage in the non-radiologic group, in which his case was included, would be slightly lower, thus accentuating the difference between them.

'The fact that the patient was a dermatologist suggested a separate estimation of the incidence of

leukemia in physicians practising that specialty. During the 10 years covered by the study 60 physicians listed as dermatologists died. Two of them, including the one reported in this article died of leukemia, giving a percentage of 3.3. This approaches the incidence in the radiologic group, but the number of cases is too small to be of statistical significance.'

The Differential Diagnosis between Renal Colic and Acute Appendicitis

By H. BAILEY

(Abstracted from the *Urologic and Cutaneous Review*, Vol. 50, July 1946, p. 398)

Woe betide a patient with gangrenous appendicitis who passes blood in the urine! Until it is better known that an inflamed appendix lying in juxtaposition to the ureter can give rise to ureteritis that causes haematuria, lives will be lost. In my experience, when blood is found in the urine, the practitioner invariably rules out appendicitis, and not infrequently the consultant aids and abets him in treating the patient for 'pyelitis'. In no less than 80 per cent of cases falling into this group, the inflamed appendix occupies a retrocaecal position.

Directly connected with this outstanding example of misleading symptomatology is the anatomical variation where an inflamed appendix is resting upon, or becomes attached to the urinary bladder. It will be readily appreciated that in such circumstances the symptoms produced are wont to be predominantly urinary, although in this instance haematuria is usually late and rare. So it comes about that numbers of unfortunate individuals presenting symptoms that direct attention to the urinary organs, are denied the advantages of early extirpation of an inflamed appendix, a boon accorded to their brethren presenting more typical clinical features.

Paradoxically, because a stone in the ureter often fails to produce either haematuria or increased frequency, but only colic, numbers of patients harbouring a stone in the right ureter bear the sear of a recent appendicectomy.

Better urgent pre-operative investigation is sorely needed.—In most instances of acute right-sided abdominal pain with urinary symptoms, a concrete pre-operative diagnosis is possible. In urban communities where the aid of radiography and kindred scientific investigations are so freely restored to, it is unforgivable that an opportunity for their employment of such vital importance should be allowed to flit by. Excretory pyelography is of proven value in eliminating renal colic when acute appendicitis is suspected.

Helge Wulff collected from the records of the surgical division of the University of Lund, Sweden, nearly 500 examples of acute right-sided abdominal pain where the symptoms were mainly urinary. Every patient in the series was subjected to urgent excretory pyelography. Those whose right kidney and ureter visualized normally were hurried to the operating theatre. No less than fifty-nine of these patients were found at operation to have a gangrenous appendix lying near the right ureter. As a result of this study, Wulff comes to the following most important practical conclusion: *If the differentiation between early acute appendicitis and renal colic is at stake, urgent excretory pyelography should be undertaken. When the pyelogram shows a normal outline, appendicectomy should be performed forthwith.*

In a number of instances, where I could not make up my mind as to whether a patient was suffering from renal colic or early acute appendicitis, I have performed urgent cystoscopy and, when facilities existed, have invoked the aid of radiology as well. With a catheterizing cystoscope alone one can often prove that the patient is suffering from a lesion of the right ureter. On several occasions after a ureteric catheter has been passed up the right ureter, a brisk dripping

of limpid urine through the lumen of the catheter has resulted in immediate amelioration of symptoms.

The Choice of Drugs in Diseases of the Chest

By N. C. OSWALD

and

J. W. SPENCE

(Abstracted from the *Pharmaceutical Journal*, Vol. 157, 24th August, 1946, p. 121)

IN recent years, great advances have been made in the management of the more serious diseases of the chest. The introduction and development of collapse therapy, postural drainage, breathing exercises, the sulphonamides and penicillin have tended to lessen the importance of non-specific pharmacological remedies. However, bronchitis and inflammatory conditions of the throat remain as the commonest affections of the respiratory tract and require treatment by expectorants, analgesics and sedatives.

ACUTE BRONCHITIS

In the early stages of acute bronchitis, when the bronchial mucosa is dry and oedematous and coughing is painful, a mixture containing a sedative and a mild expectorant is given, the following being a very popular remedy which, under different titles, is to be found in many hospital pharmacopœias :—

Camphorated tincture of opium ..	30 minims
Oxymel of squill ..	30 minims
Emulsion of chloroform, B.P.C.	5 minims
Infusion of gentian ..	to 1 fluid ounce

The use of small doses of morphine at this stage is fully justified, the cough centre being depressed by a smaller dose of this drug than is necessary to produce sleep. The squill and camphor in the mixture help to relieve the tension in the acutely inflamed mucosa and promote secretion, thus easing the pain.

Should pain be a prominent feature in the early stages of acute bronchitis, the inhalation of tincture of benzoin from a steam kettle may give considerable relief. In practice, the compound tincture of benzoin has no advantage over the less expensive simpler one of the Codex, which is usefully employed in the proportion of one fluid drachm to a pint of hot water.

When the acute stage is past, and the sputum becomes mucopurulent or purulent, more energetic measures are taken to promote expectoration. The most uniformly efficient expectorant is a 'hot water mixture' such as the following :—

Sodium bicarbonate ..	20 grains
Sodium chloride ..	3 grains
Emulsion of chloroform, B.P.C.	5 minims
Distilled water ..	to 1 fluid ounce

An ounce of hot water is added to an ounce of the mixture, and this is sipped and drunk as hot as possible. This remedy is most effective when taken on waking in the morning, and usually breaks up a tenacious sputum in about half an hour.

CHRONIC BRONCHITIS

In chronic bronchitis, the 'hot water mixture' is equally efficient in promoting expectoration. Of the well-known expectorant drugs and their preparations, perhaps ammonium carbonate (3 grains), tincture of ipecacuanha (20 minims), potassium iodide (3 grains), tincture of squill (20 minims) are the best; a mixture contains not more than one of these substances and the one selected is used in the dosage indicated. When cough is troublesome camphorated tincture of opium is added. A mixture such as the following, which combines a mild additional diaphoretic effect with reasonable palatability, has been found suitable :—

Tincture of squill ..	20 minims
Camphorated tincture of opium ..	30 minims
Spirit of nitrous ether ..	30 minims
Dilute solution of ammonium acetate.	120 minims

Camphor water .. to 1 fluid ounce

Alternatively a linctus may be used :—

Camphorated tincture of opium ..	20 minims
Syrup of squill ..	20 minims
Syrup of tolu ..	to 1 fluid drachm

BRONCHIAL SPASM

When bronchial spasm is present, inhalations of tincture of benzoin may give much relief provided the patient is not too ill; in severe cases a feeling of suffocation may be produced. Such inhalations should be restricted to patients who are confined to bed. As a routine remedy for bronchitis with asthma, the following is used :—

Potassium iodide ..	3 grains
Tincture of stramonium ..	15 minims
Liquid extract of liquorice ..	20 minims
Emulsion of chloroform, B.P.C.	5 minims
Distilled water ..	to 1 fluid ounce

BRONCHIECTASIS

In bronchiectasis, expectorants are of little value; a mixture containing potassium iodide (in 3-grain doses) may serve to promote expectoration, but the medical treatment is essentially postural.

TUBERCULOSIS

In tuberculosis, expectorants are rarely used; if a specimen of sputum is particularly needed for pathological investigation, one of the expectorants already mentioned may be tried, but potassium iodide should be avoided.

PAINFUL CONDITIONS OF THE THROAT

For painful conditions of the throat, a variety of measures may be adopted. Painting of the throat with Mandl's paint or the use of an aspirin gargle is effective in the milder cases, or a simple linctus may be given. In severe conditions, such as tuberculous laryngitis or carcinoma, a linctus such as the following is used :—

Codeine phosphate ..	1/10 grain
Citric acid ..	1 grain
Glycerine ..	20 minims
Syrup ..	20 minims
Emulsion of chloroform, B.P.C.	2 minims
Distilled water ..	to 1 fluid drachm

or

Diamorphine hydrochloride ..	1/16 grain
Glycerine ..	10 minims
Syrup of tar, B.P.C. ..	to 1 fluid drachm

Amongst the lozenges, the time-honoured Brompton variety, or a tablet containing menthol have stood the test of time. The formulæ of these are as follows :—

Extract of liquorice ..	3 grains
Oil of anise ..	1 minim
Lozenge of acacia, B.H.P. in each lozenge.	10 grains
Menthol ..	1 grain
Fruit basis, B.P.C. in each lozenge	25 grains

The official Brompton lozenges are coloured black by the addition of charcoal.

Of the inhalants, the following (5-8 drops on a Burney Yeo inhaler) is very soothing :—

Oil of cassia, B.P.C. ..	} of each equal parts
Oil of eucalyptus ..	
Oil of Siberian fir ..	
Creosote ..	

With the passage of years, many of the popular remedies of the recent past have fallen into disrepute; mustard leaves, mustard plasters and linseed poultices have almost disappeared; kaolin poultices are no longer used for the relief of 'Congestion of the lungs'. Such benefit as might have accrued for increased vascularity

is more than outweighed by the disadvantages of discomfort, soreness of the skin, and constriction of the chest by tight binders. Kaolin is, however, useful in the relief of pain in pleurisy.

ERRATUM

In the *I.M.G.*, Vol. 81, No. 10, October 1946, on page 435, column 2, line 4 from bottom, for '300,000 units' read '3,000,000 units'.

Medicolegal

Compensation Court

Rowbottom v. Shaw, Savill and Albion Company Limited

Coronary Disease and Myocardial Infarction

(From the *New Zealand Medical Journal*, Vol. 45, June 1946, p. 181)

THE plaintiff was a waterside worker, 46 years of age. On 5th May, 1943, he claimed that he sustained an accident in the course of his employment when he was helping to drag a tray along so as to place it in the chest. The pain became worse as he kept on working, but when he spelled between the loadings of the cargo the pain eased up a little. He continued working during the morning until the lunch hour and the pain, which had almost disappeared during that period, returned again with increased severity as soon as he started work. He stopped work at 3 p.m. and took a tram to consult a doctor, but not being successful, he returned to his home at Khandallah. His home was up a considerable hill and on that occasion instead of taking seven or eight minutes to walk from the station to his home it took him 1½ hours. Some time later he was admitted to the hospital and it was there found that he had been experiencing pain on effort for the previous five months.

The case was regarded in the hospital as being one of coronary thrombosis or more properly myocardial infarction. After a period of six or seven weeks in the hospital the patient was discharged with an admonition that he should not thereafter engage in heavy work.

For the plaintiff medical evidence was called indicating that as a result of the effort Rowbottom made, and especially the repeated effort, the heart was called upon to do more work than could be compensated for by his coronary blood flow. Under these circumstances of coronary insufficiency infarction of the heart muscles was likely to occur. This was the explanation of the infarction which was offered by the medical witness for the plaintiff. For the defendant Company the medical witnesses held that the infarct was the result of coronary atheroma followed by coronary occlusion and probably coronary thrombosis, a gradual and apparent insidious disorder occluding the arteries of the heart and that such a condition was not connected with effort on the heart and that such a condition was not connected with effort on the plaintiff's part.

The trial judge (Sir Archibald Blair) said in his judgment that the real dispute or divergence in the views of the experts was this: One held that the plaintiff had coronary insufficiency precipitated by some factor that increased the work of the heart or reduced the ordinary blood flow thus causing an infarction of the heart muscle without the presence of coronary thrombosis. The inciting factor of such infarction was suggested as being great emotion or effort. The other held that the obstruction in the artery which interfered with the blood supply to the plaintiff's heart and caused the infarction was due to thrombosis, an insidious disease of the arteries which is not related to external factors and that effort played no part in causing it. After reviewing the medical evidence the learned judge said that he had been referred to a

previous case—*Charlton v. Makara County Council*—which he had been invited to regard as being a precedent on which the present case could be decided. In his judgment however he said that when a compensation case was decided on questions of fact then the decision of a judge on such a question is of little help in deciding another case depending also on questions of fact. He then referred to two circumstances in the history of the case which he thought were different in material respects. One marked distinction which he referred to was that in Rowbottom's case the plaintiff had had several attacks of angina during the four or five months before the alleged accident and also that it could not be successfully claimed that the effort he spoke of as having occurred on 5th May, 1943, was one of 'abnormal severity'. The only effort deposed to on the date of the alleged accident was that related to his ordinary normal work and furthermore the pain that he felt on that date did not disable him altogether because he continued work with occasional spells, then had a spell for lunch and resumed again in the afternoon working for another two hours until he found himself unable any further to proceed. Charlton on the other hand had no previous history of heart trouble and was totally incapacitated from the moment of the alleged accident. The judgment held that the plaintiff's claim must fail.

Because of the interest which compensation cases involving coronary disease have excited in the minds of physicians and pathologists the foregoing note is submitted. The judgment is reported in full in the *New Zealand Law Reports*.

Infamous Conduct in a Professional Respect : Epstein v. Medical Board of Victoria

(From the *New Zealand Medical Journal*, Vol. 45, June 1946, p. 179)

A MEDICAL practitioner of Victoria, Zigmund Epstein, had his name erased from the medical register of Victoria by the Medical Board of that State on the ground that he had been guilty of infamous conduct in a professional respect in that he himself anaesthetized a patient and then removed the patient's tonsils by blunt finger dissection and at the end of the operation allowed the patient to be removed from the operating theatre without properly controlling the hæmorrhage.

There is provision for appeal to the Supreme Court in the Victorian Medical Act and the judgment of the Court (Mr. Justice Lowe) is set out in the *Victorian Law Reports* (1945, V.L.R., 309).

In his review of the circumstances the judge said that it was open to the Board to find that the appellant performed the operation without an anaesthetist which in itself was a dangerous proceeding and called for the exercise of the greatest care in the performance of the operation; that the appellant then operated in a crude and unskilful manner by the method of blunt finger dissection; that there was an unusual amount of bleeding; that the appellant's attention was called to that fact in the operating theatre at the end of the operation and he made no attempt to stop the bleeding or to see that anyone else did and as a result the patient's life was endangered and when he did give belated attention to the child he wrongly diagnosed the condition as one of shock: that his whole conduct showed a lack of concern for the welfare of his patient and that for all these reasons his conduct amounted to infamous conduct.

The learned judge said that if the matter had rested there and he was limited to that evidence he would not have disturbed the decision of the Board. The Court had before it however affidavits from several medical experts of high standing and from these it would appear that the method used by the appellant was orthodox and indeed was extensively used in public hospitals in Victoria and furthermore that it was easy to mistake a condition of loss of blood for shock. These affidavits also expressed the views that to operate without an anaesthetist was not improper in the

circumstances. This evidence seemed to the learned judge to vitally change his view of the nature of the appellant's conduct and to raise some doubt as to whether the appellant's conduct did in fact amount to infamous conduct. The state of doubt created was such that the learned judge held that the charge was not proved and ordered the appellant doctor's name to be restored to the medical register.

The appellant was not a British graduate. According to the medical register in Victoria he holds the qualification of M.D. (Rome), 1937.

Dying Declaration

Rex v. Ivan Manfred Kahu

(From the *New Zealand Medical Journal*, Vol. 45, June 1946, p. 180)

IVAN MANFRED KAHU, a young Maori, was indicted at the Supreme Court of New Zealand at Hamilton in February 1946 on two counts of murder, the first in relation to his wife and the second in respect of one Amundsen.

The prosecution alleged that at approximately 4 p.m. on 8th December, 1945, the prisoner murdered Amundsen by smashing his head in with blows of an ordinary claw hammer and that at about the same time the prisoner also murdered his wife by cutting her throat three times with a safety razor blade and also bashing her head in with the same claw hammer. The evidence did not disclose which of these two persons was first attacked. Mrs. Kahu was found in a dangerously wounded condition near the front door of a neighbour's house. The victims were removed to the Taumarunui Hospital where the accused's wife was operated on within a short time after her admission. Her throat had been cut by means of a safety razor blade right across from the sternomastoid muscle to the other, the windpipe being completely severed. Extensive bleeding had taken place from these wounds. In addition extensive injuries had been inflicted on her skull and brain, but notwithstanding the injuries she was not in a comatose condition when she was first seen by a neighbour or when she was first admitted to the hospital.

The Crown tendered two items of evidence submitted as dying declarations made by Mrs. Kahu. Amundsen's father found his son grievously injured lying stretched out on the verandah of his house. He went at once to get the police and this involved passing the house of a neighbour named Walsh. Squatting in the doorway of this house and holding on to the sides of the doorway was Mrs. Kahu with her head battered in and her throat cut. Amundsen asked her: 'Did Kahu do this?' and she nodded her head. He then asked her if she could speak and she shook her head. Amundsen then left to get assistance. That incident relating to Amundsen, Senr., was tendered as evidence admissible as a dying declaration by Mrs. Kahu.

Shortly after Mrs. Kahu's admission to the Taumarunui Hospital and whilst being prepared for operation by Sister Turner of the hospital staff Mrs. Kahu indicated to the sister that she wished to write and made a sign of writing on the front of the sister's uniform. Owing to her throat injuries it was impossible for Mrs. Kahu to speak. The sister then handed Mrs. Kahu pen and paper and she thereupon wrote on it as follows:—

'I'm cold
'My husband cut my
'throat while he was
'interviewing me in our house
'in Mananui
'please pull the bed
'clothes over my
'shoulders.
'Where's the doctor.'

This document was also tendered in evidence as a dying declaration.

Following the operation to suture up the severed parts of the throat and also to clear up the injury

to her skull and brain Mrs. Kahu lived for thirty-two hours.

Evidence on the medical aspects of the case was taken in Chambers from two doctors. The Presiding Judge Sir Archibald Blair after hearing this evidence and hearing argument by counsel reviewed the basis of the practice as to the admission of dying declarations made in the absence of the accused. Such declarations are admissible only upon the trial of a person accused of the murder or man-slaughter of the person making the statement. There is a further condition, viz, that the statement can be admitted in such cases only when made under such circumstances as in effect to give it the equivalent of the sanctity of an oath.

The point that must be enquired into is whether the mental condition of the declarant at the time that the declaration was made was that of hopeless expectation of death. That is a question of fact and in most of the reported cases the declarant has been able to speak. The difficulty in this case is to ascertain whether the person making the declaration absolutely believes that he or she is about to die and as it has been put in the cases the question is whether the declarant has a settled hopeless expectation of death. The learned judge reviewed some previous decisions on this matter and said that he had not been referred to any cases where the condition of the declarant's mind could be inferred from the serious nature of the injuries. He could see no reason in principle why the desperate nature of the injuries of the declarant could not alone be sufficient to enable it to be inferred that he or she had a settled hopeless expectation of death.

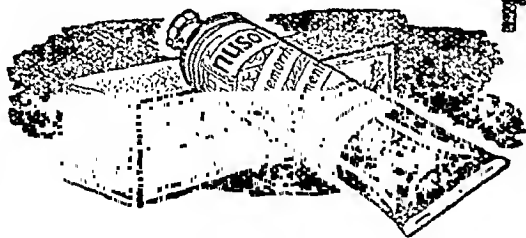
After reviewing the medical evidence on this point the learned judge went on to say that he attached importance to the fact that the injured person went through a remarkable mental and physical effort in making the written statement. She would not have done that if she had thought she was going to recover. His view was that as a pure question of fact the deceased's statement voluntarily made to Sister Turner was made with the imminent shadow of death upon her and with the solemnity which that connotes. He therefore held that it was admissible as a dying declaration.

In regard to the earlier statement made by signs to Amundsen, Senr., the learned judge held that that also was admissible as a dying declaration. Nevertheless, for reasons which are set out in the ruling and which have relation to the possibility of a new trial if this evidence were admitted the learned Judge refused to admit it. (The prisoner was convicted on both counts.)

Reviews

THE MEDICAL ANNUAL: A YEAR BOOK OF TREATMENT AND PRACTITIONER'S INDEX.—Edited by Sir Henry Tidy, K.B.E., M.A., M.D. (Oxon.), F.R.C.P., and A. Rendle Short, M.D., B.S., F.R.C.S. Sixty-fourth year, 1946. John Wright and Sons, Limited, Bristol. Pp. lxxxii plus 426 with 10 pages of index. Price, 25s.

MANY advances as result of the recent war have found their place in this volume. Two articles outline the advances in medicine and surgery which are applicable in civilian practice. The review on penicillin will be welcomed by many; in addition its uses in various conditions are separately described. Many practitioners in this country will be especially interested in the articles on DDT, researches leading to the discovery of suppressive treatment of malaria by mepacrine and the developments of the treatment of dysenteric disorders. Paludrine is too late to be included in this Annual. There is an interesting study of 100 cases of diabetes which have been watched for ten years with a view to



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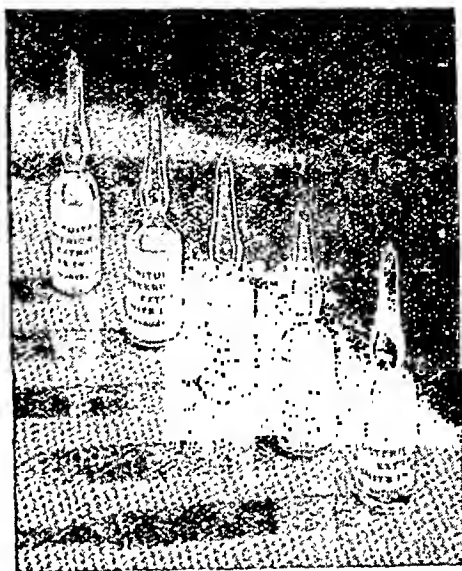
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find out what effect the high-carbohydrate low-fat diet had on the incidence of hypertension, cardiac disturbances and ocular changes. This article includes a discussion on the use of insulin and glucose in the treatment of diabetic coma.

The clinical picture and treatment of starvation should interest many physicians in these days. It is surprising to know that the word 'starvation' did not exist before the year 1775, when it was invented and first used by Henry Dundas. Its use was widely scoffed at and he became known as 'Starvation Dundas'. The book covers developments in almost all branches of medicine, and omissions, if any, must be few indeed. It is particularly valuable to those who have neither time nor opportunity to study original papers as they appear in the medical press.

R. N. C.

SURGERY OF THE HAND.—By R. M. Handfield-Jones, M.C., M.S., F.R.C.S. Second Edition. 1946. E. and S. Livingstone Ltd., Edinburgh. Illustrated. Price, 20s.; postage, 7d. (home)

The first edition of this book had such success that it is a surprise to see that six years have elapsed before the second edition has appeared.

Written simply and practically it is an ideal book for the student, the house surgeon and the industrial practitioner. The general surgeon, too, can read the book with profit for it represents experience in the busy out-patient department of St. Mary's Hospital, London.

Emphasis is laid upon rehabilitation in treatment, and rightly. The great advance of surgery in the last decade is the realization that an operation, technically perfect as it must be, is a futility unless kept in proper perspective between the foreground of adequate investigation, diagnosis and preparation, and the background of complete rehabilitation employing every means available. The short-sighted figures of immediate operative mortalities and five-year survivals are disappearing from their position of false priority. Their places are being taken by figures of degrees of recovery of function attainable and maintainable; a far more serious criterion of the value of any surgical procedure.

Mr. Handfield-Jones' book teaches this newer outlook. It is an achievement in its simplicity. Would we had more such forthright statements of individual practice.

Livingstone's productions require no praise. Mr. MacMillan has set a standard in medical publication which would be difficult to better.

A. T. A.

TEXTBOOK OF GYNÆCOLOGY.—By J. H. Peel, M.A., B.M., B.Ch. (Oxon.), F.R.C.S., F.R.C.O.G. Second Edition. 1946. William Heinemann (Medical Books), Limited, London. Pp. xvi plus 467. Illustrated. Price, 21s.

This book is an excellent summary of the latest things in Gynæcology, meant for the undergraduate and the practitioner. All the chapters are written in a very comprehensive manner avoiding descriptive details but dealing fully with the essentials. This remark is not applicable to the chapter on gynaecological operations. This has been dealt in a sketchy fashion. This defect has been made up by inserting a chapter on pre- and post-operative management.

It is really difficult to single out any chapter for special praise. The section on the physiology of the reproductive system and that on sterility and habitual abortion have been very clearly described. The chapter on endocrine therapy contains information of great value to the general practitioner—the appendix on endocrine products will be greatly appreciated by those who may not have sufficient time to devote to gather details of the preparations they prescribe for their patients. The get-up of the book is very good. It is written in plain style, making it easy for the students in India to follow.

We note, however, that the proof-reading has not been carefully done. Common words, e.g. 'uterine', 'curettage', have been wrongly spelt. On page 126 it is

written 'Vagina is only sterile at birth'. When it is meant 'Vagina is sterile at birth only'. Mention has been made of a membranous urethra in the female on page 3.

We do not subscribe to a few of the views expressed by the author. Curettage has been recommended (page 73) in the presence of uterine infection. Hot intra-uterine douches are advocated in abortions. We have never yet seen a case of pyocephalosalpinx as a sequel of recent tubal gestation, and we dare not advise in this case 'When in doubt curette' (page 332).

We have nothing but praise for this book. It is a very suitable and useful textbook for students.

M. S.

DIAGNOSIS AND MANAGEMENT OF THE THORACIC PATIENT.—By Charles Phillimore Bailey, M.D. 1945. (The American Practitioner Series.) J. B. Lippincott Company, Philadelphia and London. Pp. ix plus 334. Illustrated. Price, 24s.

This is a small monograph on Modern Surgical Practice in the management of the more usual intra-thoracic diseases. Throughout emphasis is laid upon first principles and dogmatism as to detail takes no place in the text. Diagnostic and therapeutic pitfalls are described in such a way that the novice in this speciality can take courage in the information he will gain from reading this text and go forward feeling that he knows what to expect and how at least some of the difficulties may be overcome.

The discussions on the more recent techniques of drainage and resection for pulmonary tuberculosis are welcome since these are measures likely to often help to a much larger group of afflicted persons than do the procedures at present commonly employed.

The safety of properly controlled surgical intervention in bronchiectasis is pointed out. It is unfortunate that pulmonary resection is regarded by the general practitioner and even many specialists as an unsafe operation for the bronchiectatic patient. In effect it is a highly satisfactory procedure in properly selected and prepared cases. Such cases, however, can only be selected by those fore-armed with the knowledge of what cures can resection bring about in these desperately ill people.

Management of lung abscess is adequately dealt with in a very neat chapter.

Carcinoma of the lung and oesophagus is discussed at length from the point of view of operative indications and management before and after operation.

The mediastinum and transthoracic gastrectomy receives attention in its anaesthesia and primary closure in chronic empyema.

A small but very practical book worthy of the attention of all physicians and surgeons interested in thoracic surgery.

A. T. A.

SURGICAL TREATMENT OF THE MOTOR-SKELETAL SYSTEM. Two Vols. Edited by Frederlo W. Bancroft, A.B., M.D., F.A.C.S., and Clay Ray Murray, M.D., F.A.C.S. 1945. Parts One and Two. J. B. Lippincott Company, Philadelphia and London. Pp. xix plus 612 with 29 index pages in part I and xix plus from 613 to 1254, with 29 index pages, in part II. Price, £6 for two volumes

Two volumes totalling 1254 pages are devoted entirely to description and illustration of practical procedures in everyday orthopaedic practice. Practically no space is taken by theoretical discussion, diagnostic difficulty or aetiology unless it is absolutely necessary in the interest of clarity.

Each chapter is complete in itself and seems to fairly represent the personal practice of the author. There are 43 collaborators, amongst whom are the most distinguished surgeons on the American Continent, and the 44 chapters contributed are grouped into 14 sections.

The style is reasonably uniform considering the size of the work and the number of authors.

Whilst each chapter is full in details of practice, the feeling left with the reader is always a longing

for more detailed discussion. In fact a book could easily have been written in place of each chapter and the editors are to be congratulated on their management of so large a team and so much concentrated material.

Detailed review of such a work is of course impossible, but reading at random through the work over a period of a month the reviewer finds some of the chapters are far too brief. For example: the problem of bone tumours is dealt with in a mere 29 pages including illustrations; compound fractures in one page; low back strain in two pages. The former is too important to be dealt with so shortly; the latter two so common that detail of practice must be very full.

The most glaring omission is a section on organization and management of rehabilitation. Doubtless these will be included and certain chapters extended in later editions which this work is destined to run to. There is a need for such a work and greater detail, a less discursive style and more balance between subjects of everyday practice and those of occasional appearance would put this particular book amongst the most useful yet published.

A. T. A.

BOOKS RECEIVED

1. Nutrition. Bulletin No. 24, December 1946. Published by the Department of Food, Government of India, New Delhi.
2. XXIII All-India Medical Conference, 1946, Madras. Presidential Address. By Captain P. B. Mukerji, M.Sc., M.A. (Cal.), F.R.C.S. (Edin.), F.R.R. (Lond.), D.M.R.E. (Camb.).

Abstracts from Reports

REPORT ON THE WORKING OF THE PUNJAB MENTAL HOSPITAL, LAHORE, FOR THE YEAR 1945

At the commencement of the year 1945 there were 1,224 patients as against 1,221 in 1944. Two hundred and seventy-eight admissions and 36 re-admissions were made during the course of the year and 208 patients were discharged and 87 died leaving 1,243 patients in the hospital at the end of the year. Among the discharges those cured amounted to 101, those improved were 42, those not improved and discharged otherwise were 45 and 20, respectively. The daily average strength of patients in the hospital was 1,231.78 in the year under report as against 1,232.34 in the year 1944.

Occupational therapy is largely employed and as many patients as possible are engaged for weaving cloth, gardening and other outdoor occupations.

The principal types of insanity amongst the patients treated as follows:—

Type of insanity		
Manic-depressive insanity	..	297
Mania	..	203
Melancholia	..	72
Schizophrenia	..	405
Secondary dementia	..	112
Mental deficiency	..	153
Epilepsy and epileptic insanity	..	116
Paranoia and paranoid states	..	59
Cannabis indica psychosis	..	48

Lieut.-Colonel R. M. Lloyd Still, I.M.S., has recently taken over charge as Medical Superintendent of this hospital. It has been decided to demolish the oldest and most unsatisfactory buildings and replace them by up-to-date structures and large gardens.

Besides, in order to bring this hospital into line with other modern hospitals in India, proposals for the improvement of existing medical and attendant staff of the hospital have since been submitted to Government for their sanction. The question of enhancing the number of attendants and menial staff is also receiving attention.

R. N. C.

INDIAN MEDICAL GAZETTE

Fifty Years Ago

PLAGUE IN BOMBAY

(Reprinted from *Indian Med. Gaz.*, Vol. 32, 1897, p. 63)

WE are sorry to note that there is no improvement in the prevalence of plague in Bombay. Far from this being the case, the deaths from this cause are gradually increasing. The effect on the town is disastrous. We read that in one ward alone more than one thousand shops are closed, two hundred houses shut up, and many houses, which usually contain a fair number of inhabitants, are only tenanted by keepers. The description of parts of Bombay remind us of the accounts given by DeFoe of the desolate streets of London during the plague of 1665. Nor is this all. Bombay is now quarantined by every port that has direct communication with her. Her trade is temporarily ruined, and it will be a long time before she recovers her former prosperity.

The authorities of Bombay have unfortunately been slow to recognize the gravity of the situation, and it is only now, after the visit of Surgeon-Major-General Cleghorn, that adequate measures are likely to be taken to arrest the ravages of this disease. We are pleased to see that a large number of medical men have been deputed to Bombay on special duty, and that encampments are being formed for the purpose of separating the healthy from the sick. We hope, however, with this measure, the sick will not be allowed to remain in crowded localities, for, without the provision of good nurses to attend to the patients and to secure segregation, the usefulness of the first measure is likely to be rendered futile.

We reiterate what we have stated over and over again that these measures to be of avail must be carried out on the first signs, not of an epidemic, but on the appearance of the first cases, mild or severe. It is a suicidal policy to allow this disease to acquire a hold on any locality when it is possible by prompt measures to stamp it out at its commencement. Possibly, the measures recommended may be considered to be unduly severe and costly; but when we recollect the terrible consequences of inaction, with its resulting epidemic, there ought to be no hesitation whatever in doing what is necessary. Hitherto, health authorities have been too apt to wait until deaths have occurred from plague, and to rest their diagnosis of the disease on its fatality. Recent researches indicate that, like other epidemic diseases, plague has its mild form as well as its severe, and it is instructive to learn from the paper recently read on plague by Dr. Cantlie before the Epidemiological Society of London, that the Calcutta cases of pestis ambulans, which were received with so much incredulity and almost derision by the Medical Board in Calcutta, were considered on their merits in London, and classed along with the cases of pestis minor that had occurred in Mesopotamia and Astrakhan in the seventies, and which had preceded outbreaks of plague in those districts. In this connection, it is a remarkable fact that in the Far East, as stated by Dr. Cantlie in his paper 'From Singapore, the Straits and along the Coast of China as far as Shanghai, between the years 1891 and 1896, we have accounts of a singular

affection of the inguinal glands which occupied the attention of the Singapore and Hongkong branches of the British Medical Association'. He mentions also another form of glandular idiopathic enlargement which was observed to occur in children in an epidemic form. We reproduce Dr. Cantlie's description of the glandular affection among children in Hongkong. 'In the year 1891, I reported twenty-three cases at the Medical Society of Hongkong, and since that date cases have frequently occurred. The affection consists of an enlargement of one gland, seldom more in the necks of children over the sternomastoid about the middle of its length. The swelling is seen upon the sternomastoid, but it might be found to commence, were it met with early enough, in a gland on its anterior border. The disease appears infectious and is attended by feverishness. There is no throat affection, nor is the seat of the disease in the parotid. We, the medical practitioners, styled the condition for convenience' sake mumps, but we all admitted that neither the parotid nor the submaxillary glands were the seat of trouble. It will be remembered that the term "peculiar form of mumps" was employed by some to designate the Astrakhan disease in 1877'.

In the years 1893-94, and since in Hongkong, cases of fever of a typho-malarial type occasionally presented, in the third or fourth week, a general enlargement of lymphatic glands, which lasted for a week or ten days and then subsided. They were deemed interesting cases at the time, but, with the fresh light thrown upon them by recent investigation, more especially the researches in Calcutta, they assume a new aspect.

Thus, the more the matter is enquired into, the more evident it becomes that only in exceptional circumstances does plague immediately acquire epidemic proportions in a locality, and it appears that epidemics are more usually ushered in by the occurrence of a succession of mild cases of *pestis ambulans* (sometimes called *pestis minor*). And it is important that medical practitioners should be made acquainted with this form of the disease, and with its relationship with the more fatal type of the disease. For, it is obvious that if the connection between these forms of disease is granted, it is the mild forms which are likely to escape detection in the first instance, and, by their spread, lay the seeds of an epidemic which may become uncontrollable.

PLAGUE IN INDIA

(Reprinted from *Indian Med. Gaz.*, Vol. 32, 1897, p. 65)

With reference to the plague in India, *The British Medical Journal* of 26th December, says:—'The real crux of scientific discussion centres round the Calcutta cases. The *pestis minor* or *pestis ambulans*, as it is termed, evidently prevails in that city, and the experts and others are much perplexed thereby. One man finds the bacillus in "plague" cases only to have it denied by others.

'The idiopathic buboes—*bubon d'emblee*—which for years has engaged the attention of medical men in the Far East, from the Straits Settlements and Singapore to Hongkong, seems to have reached the latitude of Calcutta. The Shropshire Regiment, moreover, the very regiment which was lying in Hongkong during the plague epidemic in 1894, and from which some hundreds of men volunteered to do "plague work" in Hongkong, is now in Calcutta. They are showing non-venereal buboes in extraordinary numbers, and their ailment is viewed with suspicion by some, and classed with others as ordinary occurrences of buboes. But we fail to recall any such disease in our textbooks, and can only join in the view that these are cases of mild plague or a separate disease.

'As will be seen from the report in another column. Dr. Cantlie in his paper on the "Spread of Plague" read before the Epidemiological Society on 16th December, 1896, discussed this aspect of the subject. He stated that idiopathic bubo—*bubon d'emblee*—has been prevalent on the China Coast for several years, so

much so that active correspondence went on between the Hongkong and Singapore Branches of the British Medical Association on this very subject as to their nature. The subsequent outbreak of plague in China raised the question whether these idiopathic buboes should be included under the heading *pestis minor* or whether they were a separate and hitherto unrecorded disease.

'The Calcutta observers are evidently divided into two camps: the exponents of the bacillus declare that a bacillus identical in microscopic appearance, but differing in toxic powers, is met with in these cases of idiopathic bubo and in those of the ambulatory form of plague which are at the present moment met with in Calcutta. Their opponents reject the bacillus altogether, denying that it is in any way allied to the true plague bacillus. The issue of the investigation will be awaited with interest.'

Any Questions

DEGREE OF IMMUNITY IN A POOR TAKE OF PRIMARY VACCINATION

SIR,—A child, aged 3 months, was given primary vaccination by two linear scarifications. Only one scarification has taken and that also at one point only of the scarification. There has been no general reaction.

In view of the poor take of the vaccination could you kindly let me know through your esteemed journal and also if possible earlier by post as to (1) how long will this immunity last to a sufficient degree to face even a heavy exposure, and (2) whether it is advisable to re-vaccinate the child without waiting for the next year and if so how soon it should be done.

Yours, etc.,

S. K. BANERJEE, M.B.

192A, LANSDOWNE ROAD,
CALCUTTA.

[The interpretation of the findings is that the child had not yet fully developed tissue response to vaccinia and so reacted poorly. He should be revaccinated this year and again next year if this year's revaccination fails. Two or three months' interval since the first vaccination will be desirable, one should not depend upon this last vaccination at all.—R. B. L.]

UMCKALOABO

SIR,—Please tell me the present status of UMCKALOABO in the treatment of tuberculosis.

1. Do you consider it does have value?
2. Where may I obtain it?
3. In what forms is it prepared, and how administered?
4. Where may I obtain a brief treatise on this drug and its use?

COLFAX,
CALIFORNIA, U.S.A.

I. R. KILGORE, M.D.

[The drug (in powder form) can be obtained from the headquarters of the company at 204-6, Worple Road, Wimbledon, London, S.W.20, England.

The results of treatment by Calcutta specialists have been disappointing.

It is available at Calcutta from Messrs. Frank Ross & Co., Ltd., 15/7, Chowringhee, Calcutta.

Literature: A book under the title of 'Tuberculosis: its treatment and cure with the help of Umckaloabo (Stevens)' was written by an English physician and published by B. Fraser & Co., Cottenham Park, London, S.W.1, some years ago.—A. C. U.]

Service Notes

APPOINTMENTS AND TRANSFERS

MAJOR F. H. A. L. DAVIDSON made over charge of the office of the Medical Officer of the *Dacca Central Jail* to Major W. J. Virgin in the afternoon of the 21st December, 1946.

The Secretary of State for India has sanctioned the reversion to military employment, of the under-mentioned Indian Medical Service (Civil) officers with effect from the 18th November, 1946.

Madras

Major P. L. O'Neill,
Major D. Tennant.

LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

To be Lieutenant

F. G. Orton. Dated 22nd February, 1946.

PROMOTIONS

Colonel to be Major-General

A. H. Harty, C.I.E., K.H.P. Dated 12th November, 1946.

Lieutenant-Colonel to be Colonel

L. K. Ledger, O.B.E. Dated 12th November, 1946.

LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Lieutenant to be Captain

Frederick George Orton. Dated 22nd February, 1946.

RELINQUISHMENTS

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Lieutenant-Colonel :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Ty. Lieutenant-Colonel T. L. W. McCullagh. Dated 1st November, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Ty. Major Amar Parsad Ray. Dated 10th October, 1946.

Major Rajinder Singh Dhillon. Dated 12th November, 1946.

Ty. Major P. V. Balakrishna Marar. Dated 16th November, 1946.

Ty. Major B. Sundararamamurti. Dated 21st November, 1946.

Ty. Major N. V. Nene. Dated 29th November, 1946.

Ty. Major Babu Ram Mahajan. Dated 14th December, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captain Valanagam Srinivas Raghavachari. Dated 8th October, 1946.

Captain D. K. Guha. Dated 9th October, 1946.

Captain Andrew Peters. Dated 14th October, 1946.

Captain J. Vaidhianadhan. Dated 29th October, 1946.
Captain Pottivale Vadivale. Dated 29th October, 1946.

Captain V. C. Kamaraju. Dated 4th November, 1946.

Captain K. I. George. Dated 12th November, 1946.

Captain Gopal Narayan Datar. Dated 14th November, 1946.

Captain Radha Raman Lal, M.C. Dated 16th November, 1946.

Captain Devki Nandan Mehta. Dated 18th November, 1946.

Captain K. N. Raman. Dated 21st November, 1946.

Captain P. Damodaran. Dated 23rd November, 1946.

Captain K. C. Banerjee. Dated 23rd November, 1946.

Captain V. K. Pillay. Dated 27th November, 1946.

Captain H. S. Malik. Dated 1st December, 1946.

Captain B. Ramchandran. Dated 2nd December, 1946.

Captain V. R. Sane. Dated 6th December, 1946.

(WITHIN INDIAN LIMITS)

Captain H. S. Henry. Dated 27th October, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of C. P. and Berar with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain C. N. Pradhan. Dated 7th June, 1946.

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Original Articles

DEATH FOLLOWING ADMINISTRATION
OF TETRACHLORETHYLENEBy R. N. CHAUDHURI, M.B. (Cal.), M.R.C.P. (Edin.),
T.D.D. (Wales)

Professor of Tropical Medicine

and

A. K. MUKERJI, M.B.

Helminthology Research Department

(From the School of Tropical Medicine, Calcutta)

THE value of tetrachlorethylene in the treatment of hookworm disease is well established, and it has rightly come to occupy a very prominent place in the armamentarium of the practitioner in the tropics. The popularity of this drug is due to its ease of administration, relatively low cost, low toxicity and high efficacy in eradicating the worms. A single treatment would remove more than half of all hookworms and two (occasionally three) treatments eradicate the infection altogether or bring it down to a negligible level. The drug has a pleasant smell and usually produces no untoward effect except some drowsiness. Toxic symptoms have been noted only rarely, and in spite of its widespread use, not a single case of fatal poisoning from it has been recorded. The following case is probably the first death caused by tetrachlorethylene and seems worth recording.

Case Report

A street beggar, aged 30 years, was admitted to the Carmichael Hospital for Tropical Diseases under one of us (R. N. C.) on the 25th April, 1946. His chief complaints were pain and burning sensation in the epigastrium with occasional vomiting and chronic diarrhoea—duration one year. He also had swelling of the legs for about two months.

Examination.—The patient was emaciated, weighing only 70½ pounds, and had marked oedema of the legs and feet. The heart and lungs were normal. There was slight rigidity in the right hypochondrium, the spleen and liver were not enlarged. Blood pressure was 110/55 mm. Hg.

Laboratory reports.—Blood: hæmoglobin 7.15 gm. per cent, red cells 4.15 millions, cell volume 29 per cent, mean corpuscular volume 69.8 c.µ., mean corpuscular hæmoglobin 17.2γγ, mean corpuscular hæmoglobin concentration 24.6 per cent, white cells 8,000 per c.mm. with neutrophils 66 per cent, lymphocytes 31 per cent, monocytes 1 per cent and eosinophils 2 per cent. Total protein in blood (copper sulphate method)—6.1 grammes per cent (albumin 2.0 and globulin 4.1). Van den Bergh reaction—negative. Wassermann reaction—negative.

Stool: no protozoa, hookworm ova 1,100 per c.c. Urine: no abnormality.

Course and treatment.—For the diarrhoea (3 to 4 loose watery motions a day) he was given sulphaguanidine, 2 grammes every four hours for seven days, along with multivitamin tablets, 2 tablets twice a day. The diarrhoea stopped, and from 4th May he was put on iron (hæmosan, 2 tablets three times a day) and magnesium trisilicate thrice daily after meals. On 9th May at 7-30 a.m. he was given 3 c.c. of tetrachlorethylene shaken in an ounce of sodium sulphate mixture (containing 4 drachms of sodium sulphate). At 10 a.m. he was found to be drowsy (a not uncommon hypnotic effect of the drug) but responded to questions. He complained of pain in the abdomen and had one big vomit of greenish colour. At about 1 p.m. the pain increased in severity, and he was rather restless, but the abdomen was soft and the pulse was fairly good. He was given atropine gr. 1/100 and somnifen 2 c.c. hypodermically as well as 50 c.c. of 25 per cent glucose solution intravenously. There was no improvement, and in the evening the pulse became feeble. Normal saline with 5 per cent glucose was given by the intravenous drip along with coramine injections every four hours. The condition however deteriorated at night, and he died the next morning.

Post-mortem report.—‘Body thin and emaciated, oedema on both feet. Rigor mortis present.

Pleural cavity—no effusion.

Lungs—right 240 gm., normal; left 220 gm., normal.

Pericardial sac—normal amount of clear fluid.

Heart small, 200 gm., epicardium normal.

Right auricle slightly distended. Left ventricle firm and contracted, chamber almost empty. Myocardium appears atrophied. Mitral valve shows old lesion; bases of cusps fibrotic. Aortic and pulmonary valves appear normal.

Abdominal cavity—small quantity of hæmorrhagic fluid present. Parietal peritoneum appears normal. Omentum shows venous congestion specially of the free margin.

Stomach—empty except for a small amount of mucoid fluid, mucosa shows scattered punctiform hæmorrhages; pylorus feels hard, no evidence of peptic ulcers.

Duodenum pale, solitary follicles enlarged.

Jejunum—in the upper third, mucosa appears pale; deep congestion of the mucosa begins at the middle third as a well-defined inflammatory process and extends throughout the rest of the jejunum and the whole length of the ileum. Lower part of the ileum looks almost blackish owing to intense congestion—an isolated patch of deep ecchymosis is present about one inch above the ileo-cæcal valve.

Cæcum—shows perityphlitis, mucosa oedematous, no evidence of ulceration.

Appendix normal. Colon—nothing abnormal seen.

Liver—small, 850 gm., pale and soft, pattern indistinct.

Gall-bladder—adhesions with omentum, small intestine and duodenum—contents appearing purulent, a condition of septic cholecystitis.

Spleen—small, 50 gm., soft and shrunken.

Pancreas—normal.

Kidneys—right 90 gm., left 50 gm., both kidneys smaller than normal. Demarcation between cortex and medulla very indistinct, capsule strips easily.

Bladder—empty, normal.

Diagnosis—acute hæmorrhagic enteritis.

Discussion

Compounds of carbon and halogens have been in use as anthelmintics against hookworm for the last 25 years, their efficacy depending on the chlorine content. The first one that was tried was carbon tetrachloride, but owing to its toxic action on the liver and kidneys and incidence of some fatalities it has largely been replaced by tetrachlorethylene. The latter is very insoluble in water, non-irritating and does not produce any local effect on the mucous membrane. According to Lamson, Robbins and Ward (1929) tetrachlorethylene differs from carbon tetrachloride in not being absorbed, from the intestinal tract of dogs in the absence of fat. If fat is present or if enormous doses are given to animals of different species, absorption may take place with symptoms and even death, but these symptoms are those of an overdose of a hypnotic not those of chemical changes secondary to liver damage, as in the case of carbon tetrachloride. There has been no report of deaths with this drug and this is correlated with its low rate of absorption in the absence of alcohol or fatty substances. Clinical observations, however, point to the fact that the drug is absorbed to some extent from human intestine but not in amounts sufficient to produce damage of the kidney or liver cells (Chopra, 1936). In a few cases marked symptoms of intoxication have been noted even after therapeutic doses. Kendrick (1929) reported one case in which after taking 3 c.c. of the drug the patient became unconscious with barely perceptible pulse; he was revived after two injections of strychnine and digitalin. Wright, Bozicevitch and Gordon (1937) mentioned the case of a boy of 11 years who after 1.1 c.c. of the drug became dizzy and cyanosed and lost consciousness but recovered after an injection of adrenaline solution. The child was subsequently found to have pulmonary tuberculosis. Hare and Dutta (1939) reported a girl of 18 who after taking tetrachlorethylene had severe vomiting followed by drowsiness which was relieved by application of cold to the head. And more recently Sandground (1941) described two cases of coma after administration of the drug with disappearance of most of the peripheral reflexes. Both recovered after injections of metrazol. In all these instances the

effects were temporary and of a narcotic nature, but there is no case on record, so far as we know, in which tetrachlorethylene had caused a severe local action on the intestine as in the case we have described.

At the time of admission the patient was obviously in a state of chronic malnutrition of which the main clinical features were emaciation and cedema of the legs. He was a street beggar, and though 30 years old, weighed only 70½ pounds. He had suffered from a chronic abdominal pain, and this was probably due to cholecystitis which was revealed only at the autopsy. The patient had also chronic diarrhoea which responded well to sulphaguanidine, but there was no old gross pathological lesion in the intestine suggestive of a specific infective cause for the diarrhoea. It is possible that it was a 'nutritional diarrhoea'. Unfortunately the nature of changes in the intestine is not definitely known as no histological reports are as yet available. The heart, liver and spleen were all small in size. It may not be unreasonable to assume that the small intestine was involved in the process of malnutrition and was particularly vulnerable to the effects of tetrachlorethylene. Although it is not possible to arrive at a definite conclusion on the point from a single case we feel that it would be wise to withhold anthelmintics in hookworm cases with obvious evidence of malnutrition. This is comparable to the treatment of hookworm disease with severe anæmia in which no anthelmintic treatment is given until the hæmoglobin level is brought up to a safe level by iron therapy.

Our thanks are due to Major K. Banerjee for the post-mortem report.

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STAB WOUNDS OF THE ABDOMEN

A REPORT ON 25 CASES

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THE experiences of last two great wars have taught us the principles of treatment of abdominal wounds caused by bullets or splinters. We have had some experience of the stab

wounds of the abdomen during the Calcutta disturbances and we feel that our observations should be recorded, although owing to the extreme emergency and the heavy inrush of casualties there was little time or opportunity to make very accurate observations and to prepare accurate statistics.

An ambulance driver, the patrolling police or military personnel usually picked up the casualty from the street and took him to the nearest hospital. First aid, which ought to have been given, was seldom given and the casualties were brought as they were found in the street. In a few cases the prolapsed viscera were accidentally discovered under the clothing while attending to the other wounds. The majority of the casualties reached the hospital within six hours. Only one case was brought after forty-eight hours.

The out-patients department of the hospital received the casualties first. The officer on duty there made a quick survey of the patient, gave a dose of morphia if he was very restless, checked the temporary dressing where applied, covered him up with a blanket and sent him immediately to the in-patients department.

We made a thorough examination of the general and local condition. It was noticed that shock was not so marked and constant a feature in uncomplicated abdominal cases (unlike what obtains in gunshot wounds of the abdomen). By uncomplicated abdominal cases we mean pure abdominal stabs in contradistinction to double or multiple injuries, i.e. abdomen and head injury, abdomen and sucking chest wound, etc. The degree of shock depended mostly on the amount of hæmorrhage from the visceral injury. Shock was estimated from the blood pressure and pulse rate, other recent methods not being available. We classified shock into three groups—mild, moderate and severe (*vide* M.R.C. War Memorandum no. 1 on traumatic shock).

Pulse rate		B.P.
Mild ..	90-120 p.m.	Syst. above 95 mm. of mercury.
Moderate ..	120-140 p.m.	Syst. 70-90 mm. of Hg.
Severe ..	140-160 p.m.	Syst. below 60 mm. of Hg.

TABLE I
Shock

	Stab wounds	Gunshot wounds for comparison
No shock	5	...
1. Mild shock ..	12	...
2. Moderate shock ..	7	6
3. Severe shock ..	1	4
	<u>25</u>	<u>10</u>

Resuscitation was started immediately in the suitable cases. Dried human plasma or serum was used. One or two pints was usually transfused. These were found very useful and handy owing to superior keeping quantities and quick availability. In some cases we used isotonic saline with or without 5 per cent glucose for resuscitating purpose. Morphia was not given until a tentative diagnosis of intra-abdominal injury was made. If after the usual treatment of shock the patient's condition deteriorated, visceral injury was strongly suspected. In our series there was not a single case of 'negative belly'.

According to the sites of the wounds, we classified our cases into five groups:—

TABLE II

Sites	Number of cases	Number of cases with prolapsed viscera
Thoraco-abdominal ..	6	0
Upper abdominal (above umbilicus) ..	7	4
Flanks ..	8	4
Back of loin ..	2	0
Buttock (ischio-rectal region) ..	2	0
	<u>25</u>	<u>8</u>

Upper abdominal and thoraco-abdominal wounds were more towards the sides of the body resulting from the position of the assailant at the back or side of the victim. The two buttock cases were stated to be standing on the bumper of a bus when stabbed.

The following signs and symptoms were the guiding factors for exploration in our cases:—

1. Prolapse of the viscera.
2. The site and severity of the wound.
3. Pulse rate near about 110 per minute.
4. Pain and tenderness—a very constant feature.
5. Rigidity—a very constant feature in abdominal cases (also noticed in some of the lower chest wound cases).
6. Vomiting was of less significance. It was noticed in stomach cases only.
7. Hæmorrhage, though surmised, could not be correctly diagnosed unless it was profuse, causing shifting dullness and signs of internal hæmorrhage, but one should not wait for its confirmation.
8. Obliteration of liver dullness was rare in our series of cases. It may be confirmatory but one should not wait for it.

Aseptic dressings were applied in the operation theatre after the anæsthesia.

Anæsthesia.—Gas, oxygen and ether were anæsthesia of choice, if possible through an endotracheal tube.

Operation.—The idea was quick in and quick out but at the same time rapid inspection of other viscera was not neglected.

Incisions were made according to the sites of the injuries.

(i) For the upper abdominal wounds paramedian incisions were used.

(ii) For stab wounds in loins or costal margin transverse incisions were used.

The stab wounds were excised scrupulously down to the peritoneum and sutured in some cases, but in other cases so much care was not taken and only the skin was excised. The results of the latter were also encouraging. The prolapsed omentum was always excised. Prolapsed small intestine was usually replaced after thoroughly cleaning with saline and suturing any perforation or injury. In the case of large intestines it was exteriorized in some cases and in others it was replaced with repair of its perforation and a drainage tube was put through the flank with or without caecostomy. At times we had to enlarge the stab wound in order to replace the prolapsed viscera. The usual practice of sprinkling of sulphathiazole was not neglected in any case.

As soon as the peritoneal cavity was opened, we looked for gas, blood and gastro-intestinal spillage but we were surprised to find that gas was conspicuous by its absence, contrary to what is found in cases of perforation of any hollow viscus. Gastro-intestinal spillage was markedly less or absent though more than one perforation was seen in many cases. Blood was present in most of the cases. When the amount was profuse and when there was no extravasation of gastro-intestinal contents, autotransfusions were done with very encouraging results. The size of perforation was usually small and no eversion of edges (cf. G.S.W.) and in fact at times we had to squeeze the viscus to discover the site of the perforation.

Stomach.—Perforations of the stomach were seen mostly in thoraco-abdominal stab wounds and were, usually, associated with injury to the liver and the pleural cavity. Most of the cases were received in the morning before the principal meal. There was no soiling of the peritoneal cavity with stomach contents. Bleeding was not appreciable as the perforations were away from the big vessels. The fundus and the pylorus were the usual sites. In one of the fundal cases the site of perforation was reached without difficulty through the left upper paramedian incision as distension was absent. The results of these cases were satisfactory—75 per cent of cases survived.

Liver.—Liver was injured in almost all the thoraco-abdominal and upper loin cases but the bleeding was not profuse. It was an incised wound with clean-cut margins and not lacerated as in most gunshot wounds. Suturing was attempted with success in some cases. Bleeding stopped in some cases before intervention. No real plugging was possible due to lack of space,

so usually a rolled gauze was left against the bleeding surface. A corrugated rubber sheet was placed between the gauze and the neighbouring viscera. No case developed biliary peritonitis or fistula. The results were good as 80 per cent survived.

Spleen.—Spleen was injured by the stab wound situated near the left costal arch. The injuries were sharp cuts and without lacerations similar to those of the liver. Haemorrhage was not profuse. The simple method of putting in a roller gauze between the diaphragm and the cut margins of the spleen proved successful. The plug was brought out through the flank. Ballance's sign and referred pain were absent, probably due to little haemorrhage. Splenectomy was done in half the cases with depressing results. Two of our four cases were treated by conservative method and were saved. Results should be good if the conservative method is followed.

Small intestine.—Perforations were usually single and small unlike G.S.W. The question of resection never arose. No extravasation of intestinal contents was noticed. Severe bleeding was associated with injuries to the mesentery. The mesenteric rent was never big enough to jeopardize the vascular supply of the corresponding segment of the intestine. In a few of the prolapsed cases the intestines were found to have escaped an injury. Result was good as 90 per cent survived.

Large intestine.—Injury of the colon was associated mostly with stab wounds in the flank. When the perforation was small, colon was sutured and reposed. The paracolic gutter or retroperitoneal space was drained and the site of injury was disturbed as little as possible to avoid contamination of the general peritoneal cavity. When the injury involved a major portion of the circumference of the gut either the injured colon was exteriorized or closed with a caecostomy. There were injuries of the superficial layers of the colon, i.e. wall, with lot of haemorrhage. Haemorrhage was severe in the colonic injuries and faecal contamination was present in most of the cases except where the opening was very small.

Rectum.—Two cases of stab through the buttock came without any involvement of the rectum and hence proximal colostomy was not done.

Bladder.—Not a single case of stab through hypogastrium or injury of bladder was found.

Gall-bladder.—One case was associated with injury of the liver and duodenum. The G.B. was repaired and the Rutherford Morison's pouch was drained. There was profuse biliary extravasation. Cholecystectomy was the operation of choice, but in this case it was considered unjustifiable owing to patient's grave general condition. Definite conclusion is not possible from our series.

Duodenum.—Two cases were met with, one as described above and the other was a stab

through the upper epigastrium dividing the first part of the duodenum in more than half its circumference. As the patient's condition was bad gastrojejunostomy was not done.

Kidney.—There were two cases in our series, one was a recent one and the other came late with a urinary fistula through the stab wound. The stabs were through the back below the ribs. The recent case was plugged through the back as the patient passed no blood with urine to start with. He developed profuse hæmaturia on the 5th day. Conservative treatment with whole blood transfusion was of no avail and ultimately we performed nephrectomy with unfortunate result. These cases are usually associated with perirenal hæmatoma and the renal pedicle becomes friable, so the ligation should be done in section. In peripheral or cortical injuries suturing or gauze plugging should be attempted. Associated intraperitoneal injuries were not seen.

Abdominal injuries complicated with head or chest injury should be judged on their merits. Minimum interference should be the watchword to prevent additional shock.

Example.—A boy of 12 had stab wound in right flank with prolapse of the colon. He had 9 injuries on the head with fracture of the skull. Nothing but resuscitation was done. On the third day the prolapsed viscera was partly gangrenous and there was distension of the abdomen. The loop of bowel about five inches long was excised and the two ends drained. Two self-retaining catheters were fixed with the proximal and distal colostomy openings. Peptonized milk was given through the distal colostomy opening for a few days. The head injuries were dealt with two days later. The boy is living and an ileotransverse colostomy has recently been done. He is progressing well. This boy had no perceptible pulse at the wrist for nearly 24 hours and no one thought he would survive.

TABLE III
Mortality

	Number treated	Number dead	Per cent
Stab cases ..	25	4	16
Gunshot cases ..	7	4	57

(Out of 10 G.S.W. cases 3 cases died before operation.)

Discussion.—It will be evident from table I that out of twenty-five cases, one patient only had severe shock and the majority of the cases belonged to group I, i.e. mild degree of shock. Why was it so? Probably it was due to quick transport, absence of laceration of tissues, small amount of hæmorrhage, absence of or insignificant gastro-intestinal spillage. The patient with severe shock had rupture of the gall-bladder, duodenum and liver. There was fair amount of blood and bile in the peritoneal cavity resulting in severe shock. Abdomino-thoracic cases

had also moderate degree of shock probably due to associated injury of the pleural cavity and diaphragm. Shock was mild and sometimes negligible in prolapsed viscera cases.

From table II, we notice that there was prolapse of viscera in 33 per cent of cases. Prolapse of viscera was due to gaping of the abdominal wall, especially when the muscles were cut across the direction of their fibres helped by the spasm of the rest of the abdominal wall.

All the patients with prolapsed viscera survived. Not a single case developed intraperitoneal infection although in one case a loop of the small bowel was found lying under dirty clothes for hours. Luckily that loop of the bowel escaped penetrating injury. The loop of the bowel was replaced after thorough toileting and sulphonamide dusting.

Hæmorrhage was free and moderately severe in hollow viscera and mesenteric injuries in contradistinction to solid viscera injury. Moreover the bleeding was marked in large bowel injury. This was probably due to retraction of the muscular wall of the intestine, but the blood vessels supplying the wall could not contract at the same time due to their oblique course. On exploration it was found that there was no appreciable active bleeding from the cut surface of the solid viscera, as the blood was coagulated by that time, the thin clot acting as a sort of plug thus preventing further oozing. Though suturing of liver was done in some of our cases, we are of opinion that most of the liver wounds can be treated conservatively by muscle or omental plug or packing. Sutures often do not hold and may cause further bleeding.

In splenic injuries, if the organ is not badly injured or its vessels have escaped injury and if it be found not bleeding when the viscera are explored, one should not do splenectomy. It will be noticed that out of the four cases of splenic injuries of our series two cases, where we did splenectomy, proved fatal, whereas the other two being treated conservatively recovered. The same remark applies for kidney injuries as well.

If the injury is not severe and bleeding is found on exploration to have stopped, and the hilum and the ureter have escaped, one should not do nephrectomy. If nephrectomy is decided the pedicle should be divided in sections instead of mass ligature. It should be realized that when the renal pedicle is surrounded by infected clot, the pedicle becomes friable and the mass ligature is liable to cut out. In our case we did nephrectomy as we thought the hæmorrhage (hæmaturia) to be secondary in nature and the wound was through and through in the central part of the kidney bordering the hilum. Had we pursued a conservative attitude, i.e. suture, pack, and drain, the case might have been saved.

Conservative treatment with secondary splenectomy for minor injuries of the spleen is advocated nowadays.

Gastro-intestinal spillage was surprisingly absent in the stomach and in most of the small intestine cases. If there was any extravasation—it was very insignificant. Most of the abdominal patients were received in the morning before the principal meal. Absence of or insignificant extravasation was probably due to comparative emptiness of the gastro-intestinal tract helped by temporary inhibition of the peristalsis subsequent to injury. The gastro-intestinal injuries were small in most cases and margins were clean cut and partly inverted (*cf.* G.S.W.). The small rent and the plastic adhesion of the incised surfaces with blood and serum were also probably contributory factors. We have observed that wounds of the large intestine leak universally in contradistinction to the wounds of the small intestine. This is probably due to the comparative fullness of the large bowel and the severance of the short longitudinal muscular coat (*tinix*).

We did six auto-transfusions with no evidence of blood infection in any case. We did not take any risk in transfusing blood from the peritoneal cavities in penetrating wounds of the bowels even though there was no apparent extravasation of the bowel content. Blood was only taken from mesenteric injury cases.

In view of the fact that sulphonamide and penicillin appear to be equally effective in the prevention and treatment of peritonitis, we used sulpha drugs intraperitoneally in all cases due to easy availability and lack of technical difficulties. We also used parenteral penicillin in some cases in addition to oral sulpha drugs.

From table III it will be evident that amongst twenty-five cases of stab wound of abdomen only four died (16 per cent mortality), out of seven cases of gunshot wound of abdomen four patients died (57 per cent mortality). This severe mortality in gunshot wound cases and the four deaths in stab cases were due to shock and hæmorrhage.

Summary

1. Shock in stab wounds was not usually marked.

2. The common sites were upper abdomen or flanks.

3. Prolapse of the viscera was fairly common and the result of treatment was very encouraging.

4. Transverse incisions afforded excellent approach to the ascending and descending colon. It also at the same time prevented unnecessary exploration of the general peritoneal cavity and spread of infection. It also helped in putting a retroperitoneal drain and in establishing an artificial anus whenever required.

5. Hæmorrhage was marked in the hollow viscera and mesenteric injuries in contradistinction to the solid viscera injuries. When the abdominal bleeding was profuse and there was no perforation of bowel auto-transfusion was done with success (3.8 per cent sodium citrate

solution was used). 10 per cent 10 c.c. ampoule of sodium citrate is available in the market (B. I. Company). One ampoule is required for every 100 c.c. of blood.

6. Most of the solid viscera injuries could be treated conservatively, *e.g.* pack, suture and drain. Nephrectomy and splenectomy should be done with great caution.

7. Gastro-intestinal spillage was absent in some cases and in others it was conspicuously insignificant. Extravasation was always present in the large bowel injuries.

8. Peritoneal infection was markedly absent—except one case of retroperitoneal hæmatoma threatened to form an abscess but it subsided with sulpha and penicillin drugs.

9. Multiple injuries were treated conservatively, depending on the merits of the case.

We convey our grateful thanks to Major E. H. Lossings, M.D., I.M.S., Superintendent of the Campbell Hospital, for allowing us to utilize the hospital records.

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A NOTE ON ESTIMATING HÆMOGLOBIN

WITH ONE CUBIC MILLIMETRE OF BLOOD

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THE common laboratory method for estimating hæmoglobin is the Hellige method of converting hæmoglobin into acid hæmatin and computing the colour against a standard. The method requires 20 cubic millimetres of blood. Working with monkeys on experimental anæmias, this amount can easily be drawn either by puncturing the ear or the posterior tibial vein. But if the experimental animal happens to be the rat, it would be difficult to collect 20 cubic millimetres of blood, unless the blood is collected from the heart direct. The usual method followed is to snip the tip of the rat's tail with scissors and collect a few cubic millimetres of blood. A number of cuttings are required to collect blood enough for one estimation by Hellige method. The short length of the tail thus permits only a few hæmoglobin estimations on the animal. So it was thought that if each

estimation of hæmoglobin as well as corpuscle-counting could be done with the blood collected by scissoring the tail once a number of estimations is possible during the course of the experiment. Moreover, the monkey as an experimental animal for work on anæmias is not the best suitable animal in that the duration of the experiment is prolonged, whereas the rat would be more suitable in that the duration of the experiment is less, provided the difficulties of doing repeated estimations are overcome. The following method seems to obviate the difficulties. In fact, the hæmocytometer fluid left over after ordinary clinical use can be utilized for hæmoglobin estimation by the method described below :

Principle

The pseudoperoxidase reaction of the blood is made use of as this method is the most sensitive known for detecting very minute quantities of blood. The method adopted is based on Wu's (1923) as modified by Bing and Baker (1931).

RBC counting

The tip of the rat's tail is scissored and as much blood as could be collected is drawn into the pipette. The hæmocytometer manufactured by any reputed firm has one cubic millimetre markings but even otherwise the instrument can be calibrated by weighing pipetted mercury. One cubic millimetre of blood is the minimum amount that has to be drawn, and the blood diluted with normal saline to the dilution mark. The counting is done as soon as possible, preferably within half an hour to obviate marked changes or lysis of the corpuscles. The remaining fluid which is well over 0.5 c.c. is used for hæmoglobin estimation. The dilution factor of the blood in the pipette also is noted.

Hæmoglobin estimation

I. The standard benzidine solution.—Stock solution of purified benzidine is made as described by Sankaran and Rajagopal (1938). One additional point may be mentioned in the method. The commercial benzidine though marked pure give always a coloured solution and requires purification. During the course of purification the benzidine solution in warm alcohol is extracted by charcoal. It requires nearly ten to fifteen extractions before the solution is clear. But usually there is always a residual colour of the solution resistant even to this treatment. This can be prevented by the use of gradually less warm alcohol in the last few extractions. The criterion of the purification of benzidine is by a blank test. A 1 per cent solution of dried purified benzidine is made by first dissolving in 20 c.c. warm glacial acetic acid and 30 c.c. of distilled water and 50 c.c. of 95 per cent alcohol. Two c.c. of this reagent with 1 c.c. of distilled water and 1 c.c. of 1 to 2 per cent hydrogen peroxide should not give a colour in 2 hours. If this mixture is diluted to 20 c.c.

with 20 per cent acetic acid and viewed through a thickness of about 1 c.cm. it should be practically indistinguishable from distilled water. Even if there is a slight coloration, the use of Pulfrich photometer gives the correction value, as it has been found that by reckoning the extinction co-efficient of this value while calculating the extinction co-efficient after the blood is added the error can be eliminated.

II. The standard blood solution may be prepared from blood whose value is calculated from any of the standard methods. The usual diluent of the standard blood is 1 per cent boric acid. Instead normal saline can be used just as in the case of the unknown and the estimation done forthwith. If the standard blood solution is to be preserved for some days, no difference in results is noticed when 1 per cent boric acid is used.

III. The method.—The fluid remaining over in the hæmocytometer after the counting of rbc is used for hæmoglobin estimation. To each of the three test-tubes is added 1 c.c. of benzidine solution. 0.5 c.c. of the blood solution of known hæmoglobin content is added to the first test-tube, that of the unknown hæmoglobin to the second test-tube and distilled water to the third. 0.5 c.c. of 1 to 2 per cent hydrogen peroxide is added to all of them when the colour deepens from green to purple in two hours. Then suitable but equal amounts of 20 per cent acetic acid is added to each of the test-tubes and the colours are matched in Pulfrich photometer. The acetic acid is used as a diluent either to make up the cell volume or to reduce the colour intensity. The cells used are 0.5 c.cm. thick and the filter is the green filter no. 11. One cell is always filled with the control solution where no blood has been used and the other cell is filled with the solutions of blood of known and unknown hæmoglobin content successively. The density drum corresponding to the cell filled with the blood solution is set always at zero and the other drum containing the control solution is rotated in order to find the extinction co-efficient. The results are calculated thus :—

$$H_u = \frac{E_u}{E_s} \times H_s$$

Where H_u = hæmoglobin content of the unknown

H_s = hæmoglobin content of the known

E_u = extinction co-efficient of the unknown

E_s = extinction co-efficient of the known

Once H_s and E_s are determined the factor $\frac{H_s}{E_s}$ becomes constant for the same particular sample of reagents and therefore the formula becomes—

$$H_u = \frac{H_s}{E_s} E_u$$

= $K.E_u$ where K = constant.

A sample of blood of known hæmoglobin content was examined and the value of the constant 'K' was calculated out to be 56.0. So in order to obtain the hæmoglobin content of unknown blood samples the corresponding extinction co-efficients are only to be multiplied by the factor 56.0. Table I gives a comparative statement of the values as obtained by this method and the Hellige. Some of the blood samples are anæmic, kindly supplied by Dr. C. R. Das Gupta, of the School of Tropical Medicine, Calcutta.

TABLE I

Hæmoglobin content determined by the Pulfrich photometer and Hellige method with commercially pure sample of benzidine

Serial number	Blood number	HB. CONTENT IN GM. PER 100 C.C.	
		Pulfrich photometer	Hellige method
1	K9	12.9	12.4
2	PP12	9.0	9.4
3	A	4.5	4.8
4	G	9.5	9.4
5	As	7.8	8.0
6	N	12.9	12.9
7	Mn	16.8	16.5
8	ASV	6.2	6.3
9	Md	3.4	3.2
10	BP	9.0	9.2
11	Gk	15.23	12.60
12	CVS	14.10	13.95
13	MNR	15.23	15.00
14	N	12.69	13.60

TABLE II

Hæmoglobin content determined by the Pulfrich photometer and Hellige method with purified sample of benzidine

Serial number	Blood number	HB. CONTENT IN GM. PER 100 C.C.	
		Pulfrich photometer	Hellige method
1	AP	10.8	10.7
2	B	15.6	16.0
3	M	13.2	13.1
4	AD	10.2	10.7
5	BH	7.2	6.9
6	J	5.4	5.5
7	HA	12.0	12.1
8	KCB10	9.0	9.6
9	KCB9	5.4	4.8
10	P	11.4	11.6

The correlation co-efficient of the results of both the experiments is more than 0.9 indicating that commercially pure samples of benzidine may be used for routine purpose. The purified sample may be used for research purposes.

Conclusion

It appears from the above that the method is fairly reliable for hæmoglobin estimation. A few additional points may be mentioned as important.

(i) It has to be noted that none of the usual hæmocytometer fluids which contain sodium sulphate can be used. When these hæmocytometer fluids are added to benzidine, a milky precipitate of benzidine sulphate is formed (precipitation as benzidine sulphate is one of the micro-methods for estimating sulphate).

(ii) This method requires the use of Pulfrich photometer and not an ordinary colorimeter. The colour developed due to the solvent and its impurities is eliminated as a common factor in the Pulfrich photometer by the use of equal sized cells. The unequal column of solution in ordinary colorimeter does not compensate for this.

(iii) The advantage of Pulfrich photometer also lies in the fact that once the extinction co-efficient of the standard solution has been found out one need not use it further for comparison, provided the same reagents are strictly used.

(iv) In addition the use of a correct filter adds to the accuracy.

(v) Much preliminary experience of the technique is required before any reliable results could be obtained.

(vi) Once the preliminaries, i.e. reagents and colour development, are finished a technician can easily test a dozen samples per hour.

Summary

A method has been suggested by which the hæmocytometer fluid left out after use can be utilized for estimating hæmoglobin. This method utilizes the well-known pseudoperoxidase reaction of hæmoglobin. By this method both hæmoglobin estimation and rbc count can be done with as small a sample as one cubic millimetre of blood.

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THE TOXIC EFFECT OF TEORA (KHESARI) ON MAN

PROTECTION OF THE PUBLIC BY LEGISLATION AND CONVERSION OF TEORA INTO FODDER

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Introduction.—Preventive medicine occupies a key position to human health. It has on its records the eradication of many epidemic

diseases in vast parts of the globe, viz, smallpox, plague, cholera, etc. But the modern conception of preventive medicine comprises a much wider field than epidemics only. This advancement has found an expression in India for instance in the field of industrial legislation for the protection of labour in factories as laid down in the Indian Factories Act of 1934 or in The Employment of Children Act of 1938. However, the science of preventive medicine does not restrict herself to removing only visible causes of disease, viz, by improving industrial machines with hitherto insufficient protection for the workmen, etc. Its aim is to create such an amount of reserves and power of resistance in man that physical and mental disorders are not only likely to be prevented, but if they still occur, are readily overcome. The attainment of this aim can be achieved by creating the best possible living conditions and healthy surroundings for the individual.

Adequate nutrition is the preliminary to individual health, and initiative and efficiency in industry and agriculture. The absence of good food is an obstacle to the attainment of the best possible level of health and causes well-known deficiency diseases and deficiency conditions in men and livestock. It is therefore one of the most essential concerns of Preventive Medicine and Public Health Authorities to protect the consumer against ill health by the introduction of a legislation for regulation of production, storage, distribution and sale of food based on the science of nutrition. Although poverty is also an important factor in the causation of malnutrition, wise planning on the above lines is apt to reduce its consequences to a minimum. Surely, still more urgent is the problem of nutrition and it is being tackled by government, if a section of the population is forced by circumstances to consume foodstuffs with even toxic action on the human body. Such a dangerous foodstuff is teora (khesari), since its consumption is known to cause lathyrism, a nervous disease with spastic paralysis of the lower extremities, which in the late stages cripples its victims and makes them a burden to themselves and to public funds (see details of this disease in the author's paper on 'Causes, Symptoms and Treatment of Lathyrism' in this journal, February issue, page 53).

Definition of teora.—Teora (synonymous are *khesari*, *matra*, *batra*, *garash*, *Lathyrus sativus*) is a kind of wild vetch, which grows among the weed and other grains and serves in the green and dry state as food for cattle. If produced as an alternative crop to wheat, etc., it is sown in October and harvested in February-March. In times of bad wheat crops and failure of wheat supplies, teora in spite of excessive rainfall and blight, remains uninjured and thrives; its grain is then consumed by men and its stalks and leaves are given to the cattle. Villagers usually consume teora as *chapatis* and the poorer section of the community is in such times reduced to

living almost entirely on teora; sometimes it is consumed mixed with Bengal gram, barley or wheat because the market price of teora grain is the cheapest among all available food grains: its rate was in 1943, 1944 and 1945 only 20 rupees per 5 maunds, whereas the wheat rate was 30 rupees and gram 35 rupees per 5 maunds in the same period (Shourie, 1945).

The toxic agent in teora.—Chemical analysis of the teora grain has been undertaken in India, but so far the chemical formula of a toxin has not been found (from a private communication by the Nutrition Research Laboratories, Coonoor). But since it has been recorded that different outbreaks of lathyrism occurred after consumption of different species of the genus *Lathyrus*, it is obvious that the toxic action is not limited to *Lathyrus sativus* only, but extends to other consumed legumes also, viz, *Lathyrus cicera*, *Lathyrus clymenum* and *Lathyrus odoratus* (see details in the author's paper in this journal). Even animals contracted in experiments a disease similar to lathyrism after feeding on *Lathyrus odoratus*: for instance, rats showed paralysis of limbs, lameness, spinal curvature of the thoracic region (Geiger *et al.*, 1933; Lewis and Esterer, 1943). These experiments on the rat have at the same time shown that the toxic agent, although not defined chemically, is readily extracted from finally ground decorticated *Lathyrus odoratus*, sweet-peas, by cold water, whereas the residue extracted is relatively non-toxic. Geiger found the same to be true by extracting sweet-peas with boiling water. These animal experiments are in accord with the observations by Ranjan (1944) on men, who advises to pour off the water, in which teora is boiled, in order to lessen the toxic effect.

In view of the failure to demonstrate the toxins in teora by chemical analysis, the following reports from Switzerland (Hoffmann, 1946) about a disease following the thrashing of barley and wheat are of great importance. Through inhalation of dust produced by the thrashing of barley or wheat the so-called 'thrash-disease' developed. Mycological examinations of these barley grains, which produce this disease, showed that a toxic fungus grows on and in them. These fungi are probably species of the genus *Alternaria* (fungi imperfecti). Macroscopically it was found that the responsible barley crop had become grey and shrunk after storage in wet surroundings. Also pigs can contract disease if fed on diseased barley. In these experiments another fungus has been found growing on such barley, namely *Gibberella saupinetii*. The pigs vomited such infected barley, lost their appetite, got very weak, and occasionally even died. If wheat-grain is defectively stored it becomes equally grey and causes after consumption a similar disease as the 'thrash-disease'. From such wheat another fungus has been isolated called *Chaetomium* (ascomycetes).

The common feature of all these pathogenic fungi is their growth on such grains only, which after harvesting are lying in the rain for too long, either in the field or afterwards in this wet condition in the barn or in sheds. In one instance, the wheat was standing in the field tied in small sheaves in rainy weather for one week. When eventually the weather is somewhat improved the wheat was spread out in the field for one day. This day was believed by the farmers to be sufficient for drying it and they consequently took it in the evening into the barn. Here it was stored in heaps of 4 m. height. But due to its wet condition and increasing temperature the heap shrank from its original height of 4 m. down to a height of only 3 m.

In view of these findings on wheat and barley grains, the problem of the toxic action of teora appears in a new light. The time after harvesting teora, i.e. after February-March till July, when the fresh teora crop is eaten, is the time of practically no occurrence of lathyrism. But the balance of the crop, which is not consumed before the start of the monsoon in July, is stored and frequently defectively stored. Consequently, during the monsoon it gets wet and we have been informed by witnesses that occasionally very bad smell emanates from freshly opened barns and that such smell often causes even strong men to faint. It is in keeping with all these facts that the outbreaks of lathyrism start in August and are at the peak during September-October when the stored grain is consumed. Because it takes in our experience not more—or probably even less—than a month after consumption of unmixed teora that the disease develops. We see therefore confirmation of our view expressed elsewhere that the toxic effect of teora is probably due to a pathogenic fungus which grows on teora after defective storage in wet condition. This explanation clears up the hitherto incongruous facts of seasonal occurrences of lathyrism and also of the occurrence of the disease in some houses of a village only leaving at the same time other houses out. The storing in the village is done individually by each family and not collectively by the village authorities: hence its defective storage in some houses with the occurrence of lathyrism and its proper storage in other houses without its occurrence.

Preventive measures against the toxic action of teora (khesari) on men.—The following measures are suggested for the protection of the public:—

1. Till we know exactly the nature of the toxin contained during certain seasons in teora and have learned to eliminate it, teora is to be considered a harmful and dangerous foodstuff for men altogether. The public should be prevented from eating it. This can safely and effectively be done only by planning and legislation under the direction of nutrition scientists.

2. Along with this legislation should go an organization of a distribution system for teora

in order to bring it and make it available to fodder-deficit areas, since teora can be turned into a very useful and nutritious foodstuff for cattle.

3. Research to be carried out in a place where teora grows and can be studied on the spot.

Re 1 and 2.—Dangerous drugs like coca leaves, Indian hemp, opium, etc., are controlled by law in the Dangerous Drugs Act, 1920, as amended in 1923, 1925, 1932 and in the Dangerous Drugs Regulations of 1937. Why are dangerous foodstuffs like teora not also controlled by a 'Dangerous Food Act', since teora is no doubt as dangerous for human consumption as the above drugs. The answer may to a certain extent lie in present economic conditions. If men have alternate grains at their disposal, they would certainly prefer these to teora; because these villagers in lathyrism-afflicted areas always seeing before them the crippled condition of their brethren, which has come about after teora consumption, are fully alive to the danger of eating teora. Medical science, though not concerned with the economic aspect of this problem, must, however, point to the necessity of putting alternate grains at the disposal of the people in order to prevent them from eating this toxic stuff. If this requirement is fulfilled, the question arises: What is to be done with the teora crop that thrives without much labour like weeding, even on poor soil, in excess of rain and in hailstorm? Is the cultivation of teora to be prohibited altogether in order to save men from lathyrism? Certainly not, because it is cattle food as well, and the livestock in India described in a recent official report as 'semi-starved' (Pepperall, 1946) requires additional food in many areas.

In times of food scarcity and rationing teora is consumed by the cultivators themselves in order to save wheat in spite of their awareness of the harmful consequences after its consumption. A suggestion for the solution of the problem at this juncture, amenable to all concerned, offers itself: In order to bring back the use of teora to its original purpose, namely cattle food, why not adulterate it to a degree that it becomes unwholesome to man but edible by cattle. Of course, this would require legislation to be introduced and carried out by government. We may suggest the following procedure:—

Government could buy up the whole teora crop and sell it back to cattle-owners at a cheap rate after having carried out the adulteration process. This process will consist of preparing the teora grains with powdered oil-cake (linseed, gingerly, etc.), and plenty of salt. Eventually, the mass will be made out into square cakes. This will be a most nutritious and tasty food for cattle, but men would and could not eat it.

The double advantage of such planning and organization is obvious. Men are given protection against a most fearful and incapacitating

disease; and cattle could get the badly required additional and most nutritional food if transport, distribution and sale at low rates of such teora-oilseed-salt-cakes is well organized by government agencies.

Re 3.—The line of research to be undertaken simultaneously with all the above described practical measures (ad. 1 and 2) is obvious from what is said under the heading 'The Toxic Agent in Teora'. We may only mention the necessity of chemical and mycological investigations on fresh and properly stored and old and defectively stored teora. Once the cause for its toxic action is established beyond doubt, it will be easy to eliminate this cause and to allow teora also to the people as a cheap staple food. Eventually, we may also mention another line of research which should go along with the last mentioned investigations. In the present world food scarcity it is of great interest to know the exact teora percentage in mixtures with other grains so that teora is deprived of its toxic action on men. If we are in the know of this safety margin, it can reasonably be used for stretching the available food resources.

Conclusion and summary

1. Teora (*khesari*, *Lathyrus sativus*) as well as other legumes of the genus *Lathyrus* have the most dangerous toxic effect on man if consumed in a highly concentrated form. They are the causes of the nervous disease 'Lathyrism'.

2. Chemical examinations have up to now not revealed the chemical formula of the toxic agent present in teora. But mycological studies of diseased barley and wheat, which has been stored defectively and has caused the so-called 'thrash-disease' in Switzerland, have shown certain fungi to be responsible for the toxic action of these latter grains.

3. Consumption of teora causes disease only in the months during and following its storage in the monsoon; it is reported by witness that from the barns opened at this time a badly smelling gas emanates. It may therefore be concluded that the toxic effect of teora is due to fungi growing on defectively stored wet teora grains.

4. Until science has established the cause for the toxic action of teora, legislation is suggested to the effect to prevent human consumption of teora.

5. A method is suggested by which teora can be used as a very nutritious cattle food.

6. Suggestions are made for research, which after successful completion, would allow consumption of teora also to man.

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SEROLOGICAL TECHNIQUE (contd.)

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ADDENDUM TO Rh +/— STATE: CON-GLUTINATION IN DETECTING ANTI-Rh BODY

RECENTLY the importance of a blocking antibody has been revealed. It is an agglutinoid which does not bring about hæmagglutination of rbc suspended in saline, but so sensitizes them that they do not agglutinate on the addition of a standard human anti-Rh serum later. Instead of being an ineffective hæmagglutinin it is a very potent hæmolytic agent in the presence of human serum.

Its presence is detected thus: The rbc under test are suspended in the serum of the subject himself or the serum of a subject AB. On the addition of a serum containing the blocking antibody hæmagglutination develops in the usual way on slides and in tubes. This is conglutination.

The easiest way to suspend the subject's rbc in his own serum is as follows: After removing the clear serum from the clot (in the tube intended for preparing serum) 'incise the clot and shake the tube. Serum turbid with rbc will ooze out. Separate the turbid serum in a small tube (Durham tube). Match the turbid serum with a standard 2 per cent rbc suspension. Add more of clear serum to reduce turbidity if necessary. The turbid serum now is a 2 per cent suspension of the subject's rbc in his own serum.

For transfusions in all maternity cases and for second or subsequent transfusions in all cases, the donor's rbc suspended in his own serum must be put up with the recipient's serum, in cross-matching, i.e. a conglutination test must be done.

This method is preferable to the use of whole blood in cross-matching. The whole blood under certain conditions coagulates and produces the appearance of hæmagglutination.

PRECIPITIN REACTION

An antigen in solution, after a parenteral entry into an animal, gives rise to an antibody which when brought into contact with it *in vitro* (in glass, in a test tube, etc.) produces a precipitate. The antibody is the precipitin. The reaction is the precipitin reaction. The precipitate is mostly the altered antibody, unlike the product of agglutination which is mostly the altered antigen.

For all practical purposes the antibody is kept constant (usually undiluted antiserum) and the antigen dilution varied to obtain this titre of the antibody. If an undiluted antihuman serum, for instance, produces a precipitate with a 1 in 20,000 dilution of human serum, it has a titre of 1 in 20,000.

The precipitin reaction is employed routinely in tracing the source of blood, for medico-legal purposes, in blood stains. It can also be used for differentiating between flesh foods such as beef and mutton.

Another important application of the reaction is found in determining the potency of antitoxins which produce precipitates with their toxins. In toxin antitoxin reaction the antibody is not kept constant always.

The flocculation reactions for syphilis are also precipitin reactions. In the Kahn test the antibody is the syphilis reagin in the human serum which produces a precipitate with the Kahn antigen.

(Reagins for many purposes behave like antibodies. The Kahn antigen is a non-specific reagent which happens to fit into a reagin. The Wassermann antigen, also a non-specific reagent, fits into the reagin in the same way in the complement fixation reaction for syphilis usually known as the Wassermann reaction.)

THE PRECIPITIN RING TEST FOR DETERMINING THE SOURCE OF BLOOD PROTEIN

In this test an extract in normal saline (sodium chloride 0.85 per cent) of the unknown stain, of the order of 1 in 1,000 dilution of the original serum in the stain, is superimposed on small quantities of known undiluted antisera. A ring of white precipitate develops at the junction of the two fluids with the appropriate antiserum. The ring is almost entirely in the antiserum.

The antisera are tested for stability, sensitivity and specificity immediately before use.

The special apparatus consists of only: (1) Tapering tubes made in the laboratory. (2) Light wooden racks holding in a single row twelve tubes. The tubes pass through two perforated shelves and rest on the bottom shelf which is without depressions and painted dull black. The racks are numbered on the left hand extremity. One should be able to examine a full rack in $\frac{1}{2}$ minute.

Preparation of the antihuman precipitin serum.—Fresh pooled serum from at least six healthy donors of blood is filtered through Seitz filter and inactivated at 56°C. for half an hour. If the donors are not available a selection is made from sera left over from the various blood tests which a serological laboratory also undertakes to perform. 3 c.c. are given intravenously to fowls which have been observed for a week to exclude disease. The serum protein is the antigen. Ten days later the fowls, after being kept on water only for 24 hours (otherwise the

serum will be chylous), are anaesthetized with ether and bled to death. Each fowl yields about 20 c.c. of blood which yields about 10 c.c. of serum. The serum is separated, tested for stability, sensitiveness and specificity, and stored frozen, if found suitable. The substance produced in the serum as a result of the injection of the antigen is the antibody. In the reaction the antibody is precipitated by the antigen: Hence the use of undiluted antisera.

The serum is stable if it does not become opalescent in a 1 in 5 dilution in normal saline.

The stable serum is sensitive if it reacts with human serum (1) in a 1 in 1,000 dilution, within 2 minutes *frankly*, +, and within 10 minutes *sharply*, ++; (2) in a 1 in 20,000 dilution, in 10 minutes *dubiously*, ±, and in 20 minutes *frankly*, +; and (3) in a 1 in 40,000 dilution in 20 minutes *dubiously*, ±. Otherwise the serum is either not sensitive enough and is discarded, or is too sensitive (when a 1 in 1,000 dilution reacts sharply instead of frankly in 2 minutes and a 1 in 40,000 dilution reacts frankly instead of dubiously in 20 minutes) and stored (in the cold, but unfrozen) for ageing and retesting.

The sensitive serum is specific if it does not react with (1) buffalo's serum 1 in 1,000, (2) dog's serum 1 in 1,000, (3) horse's serum 1 in 1,000, (4) fowl's serum 1 in 1,000, (5) sheep's serum 1 in 1,000, (6) an extract from dried stain of monkey's blood made to correspond to a 1 in 1,000 dilution at least (may err towards 1 in 500) of human serum by comparison of froth (*vide infra*). Quite a large number of sensitive sera react non-specifically, mostly with dog's serum. They are stored unfrozen for ageing and retested. If still unspecific they are rejected.

For use a frozen serum is left to thaw in the refrigerator overnight before it is exposed to room temperature. It is retested for stability, sensitiveness and specificity before use.

Preparation of other antisera.—Antisera for blood of other animals are prepared along similar lines. Antifowl serum is prepared in rabbits. The serum is taken from a single healthy animal. Its titre is less than that of sera prepared in fowls. It reacts with blood of all birds.

The number of antihorse sera reacting non-specifically is even greater than that of antihuman sera so reacting.

Extracts from stain: 1. *Stains on cloth.*—Of a good stain an area about 1 cm. in diameter is cut out and extracted with about 2 c.c. of normal saline in a test tube at room temperature for half an hour, *without shaking* (otherwise opalescence may appear). Less than half of the extract is transferred gently to another test tube, diluted with 1 to 3 c.c. of normal saline and frothed by hitting the tube against the palm of the hand. The froth is matched with that of a known 1 in 1,000 dilution of human serum, the standard. If the froth is thicker more saline is added. This is the adjustment of the serum

content by *foam test*, by equalizing the froth index (the use of two terms denoting the same mass of bubbles is regrettable). The froth may be slightly thinner but not thicker than that of the standard.

From a poor stain as much of the stain and as little of the cloth as possible is cut out for extraction.

When an extract yields poor foam the fact should be recorded on the tube together with the reason, e.g. $Fm \pm$, $Fm \pm s$ (because of small stain), $Fm -$ or $Fm -s$. This record is important in the interpretation of results (*vide infra*).

Prolonged soaking of the stain in the cold does not render insoluble stains soluble for the purpose of the serological test. The prolonged soaking recommended for crevices and joints of weapons aims only at the entry of the normal saline.

The extracts should not be opalescent. The opalescence may be removed by centrifuging at high speed or by adsorbing the extract to a filter paper, drying and re-dissolving. If it cannot be removed the exhibit must be rejected.

2. *Stains on other objects.*—The stain is scraped or washed off as appears suitable. Extraneous matter (such as vegetable matter from wood, twigs, etc., and underlying stains from weapons) should be excluded if possible. From stained earth as little of the stained material as possible should be taken. The froth index is adjusted as before. Prolonged soaking may actually interfere with the test because of (i) earth, etc., rendering the protein in the extract inert by prolonged contact with it in the presence of water and (ii) tannin, etc., going into solution and later precipitating the antiserum.

The stain selected for the extract should be free from previous chemical treatment. If a stain is very small an extract should be prepared from the whole of it first, and the chemical and spectroscopic tests applied to the residue afterwards. The tests are obligatory.

Technique for human blood: The extract from the stain.—(1) A fraction is put into a tapering tube to yield a column about $1\frac{1}{2}$ cm. high. The tube is tilted once almost 90° , to wet a small surface on one side and above the column, and then held at 45° . On the wet surface is deposited from a pipette with a capillary point enough antiserum to sink down the side of the tube and occupy about $\frac{1}{3}$ to $\frac{1}{2}$ cm. of the bottom with the tube in vertical position. The tube is made vertical again gradually. The extract is now superimposed on the antiserum. This is the test proper. (2) Another fraction is put into another tapering tube and superimposed on normal fowl serum. This is a control with the normal fowl serum. (3) When the unstained part of the exhibit is not available, yet another fraction is superimposed on anti-horse serum. This is a control with a second antiserum. The extract though without effect

on normal fowl serum may precipitate the heavier antiserum because of organic or inorganic chemicals in the cloth. In the absence of horse's blood (excluded by the facts of the case) this control should yield a negative result.

2. *The extract from the unstained part of the exhibit.*—This is also superimposed on the antiserum. This is the unstained control. For testing stains on articles of dress this control is indispensable, as beside organic and inorganic chemicals in the cloth reacting non-specifically, sweat and other animal matter may also react specifically with the antiserum. It is not likely that clothes of the accused will be so drenched with blood as not to leave an unstained area available. If that really be so an unstained area from known clothes of the accused should be provided as a control of the sweat and animal matter. The latter definitely interferes with the determination of blood group from stain.

The controls are put up and examined first. There should be no ring in 30 minutes. In the test proper the positive reaction is indicated by a ring appearing within 10 minutes and becoming at least frank if not sharp in 20 minutes. Earth mixed with blood delays the reaction: special observation is then necessary of all the controls (including those of the specificity of the antiserum) for 30 minutes.

When a reaction of almost the same intensity, within almost the same time, appears both in the controls and the test proper, further attempts at obtaining results are not made. But when the reaction in the controls is much weaker than the one in the test proper, the extracts are diluted and retested, ensuring that the extracts from the unstained part is not diluted more than the one from the stained part.

In the routine, when many tubes are under examination, racks are so filled and manipulated that every tube is examined within 10 minutes, 20 minutes and 30 minutes (if necessary).

Examination: (1) The tubes are examined in the racks within 10 minutes and left in their places if ++ or +. (2) If \pm within 10 minutes, they are transferred to the left of another rack and re-examined after 20 minutes. A + in the place of the former \pm will be accepted. (3) If negative within 10 minutes, they are transferred to the right of the other rack and re-examined after 20 minutes. Probably they will remain negative. If they turn +, the reaction will not be accepted without reference to the nature of the specimen and without repetition with concentrated extracts.

Technique for other animal's blood.—Instead of the antihuman serum other appropriate antisera are used. In the case of the antifowl serum, the serum control is put up with normal rabbit serum. When an extract of good quality is negative with antihuman sera, it is tested routinely with antisheep and antifowl sera.

Group reaction: 1. *Man and monkey.*—Fresh monkey's blood (serum) reacts with the antihuman serum almost like the human serum.

But the extract from dried monkey's bloodstains does not react in a 1 in 1,000 dilution as prepared by comparing the froth index.

2. *Buffalo and cow.*—The above technique does not differentiate between the blood of these two animals.

3. *Sheep and goat.*—The technique also fails in the case of these animals.

4. *Buffalo or cow and sheep or goat.*—The difference between the two groups can be made out easily by testing with antibuffalo and anti-sheep sera of equal potency. The group reaction appears earlier. Further, by serial dilutions a stage is reached when the extract reacts with one antiserum only.

Preparation of antihare serum in rabbits and antirabbit serum in hares has been reported in the past. It has not been repeated recently. Absorption of a group antiserum by one member's blood does not leave the required residue.

Antisera for detecting other animal's blood.—Only the antisera mentioned so far and the anti-monkey serum are kept in the Imperial Serologist's Laboratory. Any other antiserum, if required, can be prepared within a month or so.

pH of the extract.—The range for a successful serological reaction being pH 4.5 to 9.5 can be tested even with litmus paper. As a routine small strips of blue and red litmus paper are put into the balance of the extract after its serological reaction has been recorded. A certain degree of acidity which does not destroy the reaction is known to give a false positive reaction. Similarly a certain degree of alkalinity which does not destroy the reaction is known to give a false negative reaction. Usually all extracts are found to be neutral.

More than one blood in a stain.—When an extract with a good froth gives with antihuman serum only a frank or even a dubious reaction, it should also be tested with antishcep and antifowl sera routinely. Several bloods dilute each other although the froth index given by the total serum protein is good. A frank reaction must be obtained after concentrating the extract and excluding group reaction.

Feeble reaction of some coloured extracts with good froth.—Such extracts are derived from clots from which serum has drained away. The hæmoglobin imparts colour and certain amount of froth to the extract the serum-protein content of which remains poor: hence the feeble reaction. The extract should be concentrated to correspond to a 1 in 500 serum dilution and also tested with antifowl, antishcep, antihorse and antimonkey sera when it is being tested for human blood.

The hæmoglobin of an animal, although a protein, does not react with the antiserum prepared against its blood serum.

Substances responsible for a false positive reaction.—The following common substances if present in the extract precipitate the antiserum and thus produce the semblance of a positive

reaction: (1) Soap. This is of special importance in *washed* stains. (2) Rancid oil such as found sometimes on pillow cases and head dresses. The soluble fraction of the oil prevents frothing yet the extract gives sharp and quick reaction. The oil can be removed by immersion of the stain in ether. (3) Alum. This is used as a household remedy in gargles and mouth washes and may stain any article. (4) Tannin and allied substances are derived from vegetable tissue. The stain of the saliva of the betel chewer not only looks like a bloodstain but by virtue of the tannin present in most of the constituents of the prepared betel also acts on the antisera. Stains on leather and plant tissue should be removed by applying moist filter paper to the surface. (Leather contains tannin.)

Substances responsible for a false negative reaction.—Mineral acids, corrosive sublimate, chloride of lime, sulphate of copper and iron, bisulphide of carbon and sodium, nitrate of silver, thymol and permanganate of potassium abolish the reaction.

Tropical influences.—Some stains become insoluble within a few months. Putrefaction of wet stains weakens and destroys their serological reactions.

Results other than positive: 1. *Disintegrated.*—Stains are reported disintegrated: (1) When stains of poor quality (foam \pm or $-$) react chemically but not serologically. (2) When under standard conditions frank rings are not obtained with the routinely used antisera. This is done even though all sources (e.g. fish, frog and snake) are not exhausted. (3) When poor extracts (foam \pm or $-$) give sharp rings and/or react quickly. The extract from the unstained part of the exhibit also acts in such cases. Probably chemicals are present in the fabric. A $Fm \pm s$ or $Fm - s$ extract giving a frank reaction which is not quick is accepted as positive. (4) When rich extracts give weak reactions (e.g. dubious reaction just turning frank in 20 minutes, instead of being sharp in 10 minutes) and the possible interferences have been excluded (*i*, more than one blood; *ii*, excess of hæmoglobin; *iii*, presence of earth). (5) When anomalous reactions occur. This category includes the lack of correspondence between the controls and the departure from the normal of the size (*i*, very thin; *ii*, very thick, *iii*, more than one) and shape (*i*, broken periphery of the disc; *ii*, honeycombed mass of precipitate; *iii*, conical or spherical surfaces) of the ring.

2. *Negative.*—Exhibits stained with blood of good quality but not giving the reaction of human blood are reported 'Not stained with human blood (or any other blood specified in the requisition)' or 'Stained with the blood of a ruminant animal or a bird (as the case may be)'.

3. *Such reaction that no opinion is possible.*—Occasionally, an extract, on concentration, reacts with several antisera to almost the same degree and against expectations. This category differs from 1(5) in not being so obviously anomalous.

Possibly mammalian and group reactions interfere due to concentration.

Tests for animal tissues.—The precipitin test will determine the source of tissues like muscle, bone, skin, etc., if their identity as tissues can be determined histologically. The material for the extract is taken from the inside of the object with a view to avoiding the reaction of the superimposed blood. Previous application of heat (as in cooking and partial cremation) renders the serum protein insoluble and weakens or destroys the reaction. An attempt should be made with all but charred remains.

Tests for stains of animal origin, other than bloodstains.—These stains in order of their importance are: 1, seminal stains, 2, faecal stains, 3, salivary stains, 4, urinary stains and 5, sweat stains. Only the origin of a seminal stain can be determined, like that of a bloodstain, after its nature has been determined by finding spermatozoa and blood excluded chemically and spectroscopically. The nature and therefore the source of the rest cannot be determined.

(To be continued)

LOCAL TREATMENT OF INFECTED EXPERIMENTAL WOUNDS*

By B. V. PATEL

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DANN, GLUCKSMANN and TANSLEY (1942) tried cod-liver oil and its various fractions in the treatment of experimental wound in rats. They found that cod-liver oil acts as a mild irritant, which perhaps benefits healing by stimulating the formation of granulation tissue.

Sulphonamides have been used very widely both locally and internally for the treatment of infected wounds. The clinical progress of most of the cases has been satisfactory and healing occurred rapidly. In the course of investigations on control of sepsis in war wounds, Dikshit and Gardham (1945) found it desirable to have a 'water-in-oil' type of emulsion for making sulphanilamide paste, so that the absorption from the site of application may be slow, and at the same time a high concentration be maintained near the wound. The local treatment is preferable to internal drug treatment, as it has the advantage of precluding the danger of severe toxic effects of the drug.

This paper reports the results of investigations made with pastes made with the following formula using six different sulphonamides, namely, sulphasuxidine, sulphadiazine, sulphaguanidine, sulphamethiazine, sulphanilamide and sulphathiazole.

Sulpha drug	..	..	12 g.
Calcium oleate	..	..	3 g.
Bees wax	..	..	3 g.
Cod-liver oil	..	..	60 c.c.
Water	..	..	40 c.c.

Method of preparation.—The ingredients are sterilized individually and the paste made under aseptic technique. Calcium oleate is first rubbed with a small quantity of cod-liver oil in a mortar, and then the sulpha drug is incorporated. Bees wax is heated with cod-liver oil to a temperature of 80°C., poured into a mortar and constantly stirred. Boiling water is then added and stirring continued till the temperature of the paste comes down to 37°C. This paste is then filled into sterile collapsible tubes.

Treatment of wounds in rabbits.—Rabbit was used as the experimental animal for this investigation. Circular wounds, 2 cm. in diameter, were made on the shaved back of the rabbit by incising the skin with several 'criss-cross' incisions. Bleeding points were touched with hæmostats and the wounds were infected with a drop of a suspension of mixed culture of *Streptococcus hæmolyticus*, *Staphylococcus aureus* and *Bacillus pyocyaneus*. Four wounds were made on each rabbit and after infection three were treated by the application of paste and covered with a piece of lint which was kept in position by adhesive plaster. Each rabbit had one wound which was not treated and covered only with lint. These rabbits were examined every third day and redressed. The results of all the experiments have been summarized in table I.

This shows that of all the six drugs, sulphathiazole produced the best results, since the discharge was much less, pus cell formation and the growth of cocci were arrested on the 8th day, and healing began earlier and was complete on the 11th day. Sulphadiazine was the next best, because discharge and pus cell formation were less and the edges of the wound were clean and soft. Sulphanilamide showed good but slow healing, i.e. complete healing on the 15th day.

Concentration of the drug.—In order to determine the maximum concentration reached due to local application, the drug in the form of emulsion was injected into the muscles of the flank using a lumbar puncture needle. 2 c.c. of the paste were injected in each case and samples of blood were collected at the end of 1, 4 and 24 hours. The concentration of the free drugs in the samples of blood was determined by the method of Bratton and Marshall (1939). The concentrations of the free drug reached are given in table II.

Discussion

The investigations bring out two main points. Firstly, the concentration of the drug, in any case, does not go high except in the case of

* Read before the Indian Science Congress Session held at Bangalore in January 1946.

TABLE I

Drugs	3rd day	6th day	8th day	11th day	REMARKS
Sulphasuxidine ..	D + P - H No signs of healing. O + +	D + P + H Healing begun. O + +	D + P + H Half healed O ++ -	D ± P + H Three-fourth healed. O + +	Healing slow although discharge is less.
Sulphadiazine ..	D + P - H No signs of healing. O + +	D + P - H Healing begun. O + +	D ± P + H Half healed O + +	D ± P ± H Almost healed. O + +	Rings round the edges soft. Discharge comparatively less.
Sulphaguanidine	D - P - H No signs of healing. O + +	D - P + H Healing begun. O + +	D + P + H One-third healed. O ++ -	D + P + H Half healed O + +	Vascular reaction around the wound very marked. Hard ring round the edges.
Sulphamethiazine	D - P - H No signs of healing. O + ++	D + P + H Healing begun. O + ++	D + P + H One-third healed. O + ++	D - P + H Half healed O + +	Wounds showed clean edges. Margin elevated.
Sulphanilamide ..	D + P - H Shows signs of healing. O + -	D + P + H One-fourth healed. O + +	D + P + H Half healed O + +	D ± P + H Three-fourth healed. O + +	Hard ring round the edges.
Sulphathiazole ..	D - P - H Shows signs of healing. O + +	D + P + H Half healed O + +	D ± P ± H Three-fourth healed. O - ±	D - P - H Completely healed. O - -	Ring round the edges soft. Discharge much less.
Control ..	D + P - H No signs of healing. O ++ ++	D + P + H Healing begun. O ++ ++	D + P + H One-third healed. O ++ ++	D + P + H Half healed O ++ ++	Hard ring round the edges. Hard scum formed.

D = Discharge. P = Pus cells. H = Healing. O = Organisms. (*Cocci, B. pyocyaneus*.)

TABLE II

Drugs	CONCENTRATION IN MG. PER CENT		
	1 hour	4 hours	24 hours
Sulphasuxidine ..	1.49	0.50	0.17
Sulphadiazine ..	0.98	1.23	0.81
Sulphaguanidine	1.05	1.05	0.34
Sulphamethiazine	0.82	0.68	0.69
Sulphanilamide ..	3.65	6.00	0.43
Sulphathiazole ..	0.83	0.75	0.30

sulphanilamide. Secondly, sulphathiazole was found to be the best of the sulphonamides. Hawking (1941) has shown that sulphonamide applied locally penetrates only a few millimetres

into the infected tissue and, therefore, may not reach viable bacteria. It seems probable, however, that provided the bacteria in the necrotic tissue and exudate, which is the actual culture medium, are destroyed the deeper granulating zone with its own capacity for combating infection is easily capable of overcoming the deeper infection. The rapid development of healthy granulating tissue actually observed during this treatment suggests that the reduction in the number of organisms in the surface exudate allows this tissue to rapidly assume its normal protective function.

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A Mirror of Hospital Practice

PARKINSONISM IN TYPHOID FEVER

By P. N. LAHA, M.D. (Patna)

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PARKINSONISM may be the end-result of paralysis agitans, encephalitis lethargica, arterio-sclerosis, poisoning with manganese and carbon monoxide, trauma, syphilis and hepato-lenticular degeneration. Horder (1946) describes having seen a condition indistinguishable from paralysis agitans follow a severe attack of influenza, which ended in complete recovery after several months.

Below is recorded a case of typhoid fever in whom Parkinsonism developed as a complication. Such a complication is very unusual and as such worthy of publication.

Case report

J., 19 years, Hindu male, was admitted into the hospital with the complaint of high continued fever, duration 15 days. There was history of discharge of pus from the right ear, duration 10 years. Before the attack of fever patient got severe right-sided ear-ache with profuse discharge of pus. Four days later he had frontal headache and fever. After another 4 days he became semi-comatose with facial paralysis on the right side.

On examination the patient looked acutely ill; temperature 101°F.; pulse 90, respirations 22, per minute; blood pressure 85/45. There was masklike facies with exceptionally greasy skin and right-sided infranuclear facial paralysis. Neck and trunk were markedly rigid. Kernig's and Brudzinski's signs were strongly positive. The extremities were rigid, flexed and adducted. Tendon jerks were diminished. Sensations could not be tested accurately. Abdominal reflex was intact in all quadrants. Babinski's sign was flexor on both sides. There was no tremor anywhere. Other symptoms were normal.

Investigations.—Fundi normal. Cerebro-spinal fluid 20 ml. was drawn out under high tension by lumbar puncture; a few monocytes were found; protein 1.2 per cent, sugar nil, and chloride 775 mg. per 100 ml.; no micro-organisms. Total white cells 14,000 (polymorphonuclears 59 per cent, lymphocytes 41 per cent; no parasites). Blood culture—*B. typhosus* was isolated. Widal test (on 18th day of fever) was positive against *B. typhosus* 'H' up to 1/640 dilution. Urine and stool normal. Wassermann reaction negative.

Progress and treatment.—He was put on usual treatment for typhoid. After 31 days he gradually became afebrile. After another

fortnight his Parkinsonism disappeared completely. The discharge of pus from his right ear was controlled but the facial paralysis persisted.

Discussion.—It was a frank case of typhoid fever with Parkinsonism as a complication. Parkinsonism was the result of inflammatory involvement of either the corpus striatum or the substantia nigra. The inflammation gradually subsided and along with it the Parkinsonism disappeared. Absence of tremor could be explained by the fact that rigidity was very marked, for there is an antagonism between the tremor and rigidity of Parkinsonism. The facial paralysis was evidently a complication of otitis media.

Acknowledgments

My thanks are due to Major-General H. C. Buckley, C.S.I., I.M.S., Principal, Medical College, Agra, for his kind permission to publish this report and also to my colleagues of the Pathology and Biochemistry Departments for their valuable help in investigating the case, also to Drs. R. P. Singh and H. Prasad, who helped me in treating the case.

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Therapeutic Notes

NOTES ON SOME REMEDIES

VII. SULPHONAMIDES

III

By R. N. CHAUDHURI, M.B. (Cal.), M.R.C.P. (Edin.), T.D.D. (Wales), F.S.M.F.

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6. *Urinary tract infections.*—In acute cystitis and pyelitis and in chronic infection due to coli bacilli sulphanilamide is adequate but sulphacetamide has been particularly recommended because of its high solubility in urine. Its sodium salt (albuclid soluble) may be injected intravenously in 30 per cent solution. Sulphathiazole or sulphadiazine may be given in resistant cases. The average daily dose is 3 gm. given in doses of 0.5 gm. four hourly, but during the first day 5 to 6 gm. may be given in order to bring about a rapid rise in the concentration. Fluid intake should be 5 pints daily to ensure a urinary output of at least 2 pints. The drug is more effective if combined with alkaline diuretics, so along with it a mixture of sufficient sodium citrate and sodium bicarbonate should be given to render the urine alkaline. With this treatment, pain, pyuria and albuminuria disappear more rapidly than with alkalies alone. After a

few days the urine should be re-examined to see if there has been relapse, in which case the treatment is repeated but this indicates the need for careful urological investigation. Infections due to *Staphylococcus aureus*, *Ps. pyocyaneus* and *B. proteus* are less sensitive, while *Streptococcus faecalis* is resistant to sulphonamide therapy. Mandelic acid treatment may be tried for obstinate relapses or when the organisms are resistant.

7. *Veneral diseases*.—The treatment of gonorrhoea has now been greatly simplified. Large initial doses are not required nor is it necessary to have a high blood level. The more effective drugs are sulphathiazole and sulphadiazine. A dose of 5 gm. distributed evenly over 24 hours and taken for five days is usually sufficient in uncomplicated cases. If it is not convenient to wake up at night, 1 gm. (2 tablets) should be taken at bed time and another similar dose on getting up from bed. Local treatment with irrigation is usually unnecessary. A small percentage of cases are resistant to the drug and are best treated with penicillin. More often the failure to respond to sulphonamide is due to extension of the disease to posterior urethra, prostatitis, etc. In such cases the treatment is given up to seven days and then after a week it is repeated, preferably with a different drug and accompanied by local irrigations. In the interval between the two courses some workers prefer to give intramuscular injections of a non-specific protein preparation such as sterile milk (2 to 5 c.c.); two such injections are given during the week.

The incidence of complications has been much reduced by chemotherapy; this is materially helped by proper rest and administration of the drug at a very early stage. The majority of complications respond readily to sulphathiazole in adequate dosage, but if there is an enclosed focus of infection, it is usually necessary to secure free drainage by local treatment. The drug is often disappointing in acute arthritis and tenosynovitis and seldom of value in chronic arthritis. Chemotherapy does not obviate the need for keeping the patient under observation up to three months before he is declared free from infection.

In the female chemotherapy is equally successful. Good results have also been obtained in ophthalmia neonatorum; full dosage should be given; after an initial dose of 0.25 gm. the drug is continued in 0.125 gm. ($\frac{1}{4}$ tablet) doses six hourly for five days. Local treatment by gentle irrigation with saline is seldom necessary after the first day. Rapid recovery however follows the instillation of eye drops of penicillin solution containing 500 units per c.c. repeated every two hours. Corneal ulceration responds rapidly and seldom occurs after chemotherapy has been begun. When it is present, 1 per cent atropine sulphate should be instilled into the eye.

For *chancroid*, sulphanilamide or sulphathiazole is given in a dosage of 5 gm. a day for

seven to ten days. The results are usually very good. Some cases are however resistant and these may be treated with dmelcos vaccine. The local sore is washed twice a day with warm saline and dusted with sulphanilamide powder. In patients with tight phimosis and underlying ulcerative lesions, the preputial cavity is irrigated with potassium permanganate solution, but healing is sometimes delayed and it may be necessary to secure free drainage of the ulcers by a small operation. Buboec should not be incised if possible but may require aspiration. In early cases of *Lymphogranuloma inguinale* the response is good. A dose of 25 to 30 gm. by mouth is given in five to seven days, repeated, if necessary, after a brief respite. In the majority of cases there is speedy resolution of the lesion. In resistant cases this treatment may be followed by non-protein shock given by a series of T.A.B. or dmelcos vaccine.

8. *Peritonitis*.—Sulphonamide therapy has been extensively employed as an adjunct to surgical treatment in peritoneal infection due to appendicitis, perforated peptic ulcer, etc., or where the peritoneal cavity has been soiled by trauma or at operation. Sulphanilamide, sulphathiazole or sulphadiazine is used; the latter has the advantage of being slowly absorbed and so its action lasts longer than the other two drugs. The dosage depends on the amount of contamination present. It is best applied as a fresh suspension (previously autoclaved at 20 lb. pressure for 20 minutes) of 10 to 20 gm. of the powder in 4 to 10 ounces of saline warmed to body temperature. After removal of any free pus as far as possible, the suspension is squirted into the abdomen as a fine jet from a record syringe without a needle and part of it is applied to the edges and layers of the wound after closing the peritoneum. Supplementary chemotherapy by mouth or injection might improve results if peritonitis is already established or associated with a blood infection; it should not be begun until after 48 hours when blood concentration from the intraperitoneal application begins to fall. Sterile sulphanilamide powder can be dusted in the abdominal cavity as a prophylactic after operation for perforated peptic ulcer, removal of infected fallopian tube, etc.

9. *Wounds*.—Opinion is not unanimous on the value of sulphonamides and they are better reserved for obvious contaminated wounds. Much depends on such factors as presence of dead tissue and sloughs, degree of contamination and the time that has elapsed before the treatment. The sulphonamides are certainly helpful in controlling the infection, particularly by hæmolytic streptococci and preventing its spread, but success depends first and foremost on adequate primary surgery, and care must be taken that the drug reaches the depths of the wound. Sulphanilamide can be used locally, but a mixture of the drug (3 parts) and sulphathiazole (1 part) maintains the concentration for

a longer time. Another combination which is specially effective in infections caused by gram-positive and gram-negative organisms is a powder containing 1 part of proflavine and 99 parts of sulphathiazole. This powder is a little irritating to the tissues and should be applied sparingly; the treatment is repeated at two-day intervals, if necessary, but not more than three such applications should be made. Whichever powder is used it should be sterilized and kept in a sterile container. It is insufflated in a thin film over the raw surface not exceeding 10 gm. at any application. Sulphonamides should not be applied in the immediate neighbourhood of important nerve trunks and only sparingly to wounds involving the brain; sulphathiazole in particular should never be applied to the brain as being likely to cause epileptiform convulsions. When there is great risk of septic infection, a course of sulphathiazole by mouth seems to be of definite value, the dose being reduced owing to absorption of the drug locally applied (approximately this gives in the first six hours 0.5 mg. per 100 c.c. of blood for each 1 gm. of the compound and thereafter the concentration rapidly falls). The first dose should be 2 gm. and then 0.5 gm. at four-hourly intervals for four days. Shock and hæmorrhage are not contra-indications to their use, but precautions must be taken against renal complications. An essential part of treatment of any large wound is adequate splinting.

It is unwise to apply sulphonamides repeatedly to wounds which are healing satisfactorily, but, in the later stages, their local use may be valuable when healing by granulation tissue is retarded by the presence of streptococci.

In the local application to wounds, penicillin has many advantages over sulphonamides, but the two are quite compatible and they can be conveniently combined in powder form.

10. *Burns*.—The primary aim in the treatment of burns should be to avoid infection and this is made possible by the inhibition of bacterial growth which results from the local application of sulphonamides. In ordinary circumstances, a patient with severe or extensive burn should be immediately removed to hospital without any attempt to give first aid beyond keeping him warm and giving morphine if need be, but when superficial burns are treated at home or when larger burns cannot receive proper treatment without considerable delay, they may be smeared under aseptic conditions with a water soluble cream containing 1 per cent 'cetavlon' and 3 per cent sulphanilamide and carefully wrapped in sterile lint and a bandage. The cream should be removed within two days because of a slight risk to dermatitis by cetavlon, and replaced by the mixed cream mentioned below.

If the patient is suffering from shock, local treatment is confined to application of a first aid dressing only. The shock is treated first and complete cleansing and dressing are postponed till the second or third day when the blisters are

carefully removed, and the burnt area is cleaned with soap and water, or better with 1 per cent cetavlon solution. A mixed sulphonamide cream such as the following is then applied: sulphanilamide 3 gm., sulphathiazole 3 gm., glycerine 10 gm., castor oil 25 gm., lanette wax sx 10 gm. and water 49 gm. The burn, which must be widely covered and firmly bandaged, is left untouched for seven to ten days unless the affected part is such that contamination is unavoidable. A little fever (up to 102°F.) is in itself no indication for changing the dressing. On removal of dressing, many second-degree burns will be found to have healed, but the cream may be reapplied for a further week if necessary. This treatment is effective in a large proportion of cases, but in some the hæmolytic streptococcus is able to establish itself from lack of aseptic and antiseptic precautions. It is therefore most necessary to observe a high standard of technique for dressing. Streptococcal infection of burns which are resistant to sulphonamides may respond to penicillin or to propamidine.

11. *Miscellaneous infections*.—(1) *Anthrax*: The sulphonamides are a safe and reliable substitute for anti-anthrax serum. Sulphathiazole is recommended, but if there is no response in three days the serum is indicated.

(2) *Brucella infections (Undulant fever)*.—Reports are conflicting and the sulphonamides are still being tried. Chaudhuri and Rai Chaudhuri (1943) reported a case in whom sulphapyridine and sulphathiazole were used; both had a more or less immediate action in controlling fever but not the subsequent bout of fever. Probably the dosage was not sufficient. Manson-Bahr (1945) recommends large doses, and for prolonged periods, 4 to 9 gm. daily for courses of four to five days each.

(3) *Diseases and injuries of the eye*.—Sodium sulphacetamide is valuable in many of these cases. *Blepharitis*: an ointment containing 2.5 to 10 per cent of this drug or 5 per cent sulphathiazole is applied 1 to 4 times daily, or where an ointment is unsuitable, a 10 to 30 per cent solution of sodium sulphacetamide may be painted along the roots of the lashes. *Conjunctivitis*: A 10 per cent solution is instilled two hourly in acute condition and a 2.5 per cent solution is instilled in less acute conditions. *Corneal ulcers*: A 10 to 30 per cent solution is instilled several times a day. *Trachoma*: The action seems to be not on the virus but on the secondary infections so often associated with trachoma. Dramatic alleviation of distressing symptoms such as photophobia can be produced. Sulphanilamide has been recommended (1) in a daily dose of 2.0 gm. and (2) as a local application in saturated solution several times a day. This is given for ten days followed by ten days' rest, and then a second course for ten days is given. As a prophylactic against infection after injuries and burns, several drops of a 10 per cent solution of sodium sulphacetamide are instilled as soon as possible.

(4) *Plague*.—The most important single factor which decides the issue in human bubonic plague is the development and degree of septicaemia. The sulphonamides are the best drugs at present available in the treatment of this disease. If they are given early, septicaemia seldom develops, and when this is present, they give far better results than any other treatment. Sokhey and Wagle (1946) recommend sulphathiazole to start with an initial dose of 2 gm. followed by a similar dose after four hours and then 1.5 gm. four hourly during the first 24 hours. It is then continued in one gramme dose four hourly and is stopped two days after the temperature comes to normal and the patient's general condition improves. Anti-plague serum with sulphathiazole, according to these authors, seems to easily bring the toxæmia under control. They found even better results with sulphadiazine but the number of cases treated with it has not been large enough. This drug is given with an initial dose of 4 gm. followed by 2 gm. four hours later and then 1 gm. four hourly. Neither of the two drugs is given for more than ten days. The indications for parenteral administration are the same as in other serious diseases.

(5) *Smallpox*.—The sulphonamides exert no influence on the virus and therefore do not modify the toxic phase of the disease, but the pustular phase does appear to be modified, the lesions being arrested at the vesico-pustular stage with a resulting diminution or suppression of the secondary fever. The septic complications which occur so frequently in the focal phase are profoundly influenced; either they are prevented or rendered mild. Sulphanilamide is given four hourly and discontinued as soon as scab formation commences. Perhaps sulphathiazole or sulphadiazine would be better as the septic infection may be due to organisms other than streptococci.

(6) *Vincent's angina*.—Manson and Craig (1945) got good results by giving a 0.5 gm. tablet to dissolve on the tongue every two hours during the day and 2 tablets every four hours during the night. Temperature usually returned to normal in 24 hours with almost complete disappearance of symptoms. Treatment was continued for 72 hours except in mild cases in which it was terminated at the end of 48 hours. Lesions invariably cleared in 96 hours after beginning of treatment.

Prophylactic use

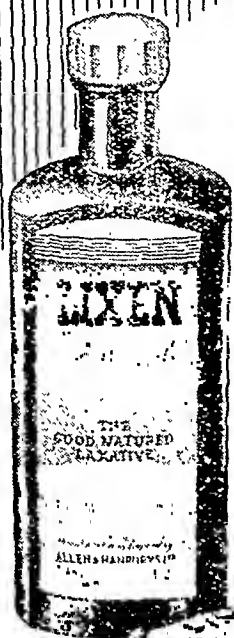
In certain instances the sulphonamides are of value in prophylaxis, but they should not be indiscriminately used, and in no case for more than a week or ten days. Comparatively small doses are given. Sulphadiazine and sulphamerazine may be employed with advantage as they remain longer in the blood owing to slow excretion.

In patients requiring *tonsillectomy* or *extraction of teeth*, in whom the presence of a streptococcal infection is suspected, the drug is given

two hours before the operation and continued in 1 gm. doses at four-hourly intervals as soon as possible after the operation for two days. For *post-partum* cases in which there has been considerable interference similar treatment should be given but continued in reduced doses for a week. To prevent *urinary tract infection*, e.g. after instrumentation or when an indwelling catheter is required for some days, sulphanilamide or sulphadiazine is given at first four hourly and then six hourly. Sulphonamides have no action on *measles*, but given for a week after the appearance of rash, greatly diminish the occurrence of otitis media and bronchopneumonia. Similarly in *diphtheria*, after tracheotomy, the use of these drugs has almost eliminated broncho-pneumonia. In outbreaks of *cerebro-spinal fever*, there is invariably a high incidence of symptomless carriers and this is efficiently lowered by giving sulphadiazine in 2 to 3 gm. daily doses for three days. To be effective, such prophylactic courses should be applied to a closed or semi-closed community as in school, ship or camp and they are useless in an open population where chances of re-infection is considerable. In outbreaks of *bacillary dysentery* as in residential schools, symptomless carriers are also common and spread the disease. To control the infection, 1 to 2 gm. daily doses of sulphaguanidine are given until a few days after clinical cases have ceased to occur. Succinyl sulphathiazole is more effective when the infection is due to *Sonne bacillus*. Experiments under war conditions have proved that sulphathiazole or sulphadiazine has considerable value in the prevention of *gonorrhoea* and *chaneroid*. According to one method 2 gm. of sulphathiazole are taken either one hour before or within three hours of exposure; in another, three doses of this drug (3 gm., 2 gm. and 1 gm. at intervals of four hours) are taken during the 12 hours after exposure. Lees (Dunlop *et al.*, 1946) recommends an ointment (calomel 33.3 per cent, sulphathiazole 10 per cent and hydrarg oxycyanide 0.1 per cent in a base of equal parts of adeps lanae hydrosus and soft paraffin) as an additional protection. It is conveniently dispensed in collapsible tube. About 2 gm. of the ointment are rubbed into the genital area, particularly the coronal sulcus and frenum, and a small quantity is introduced into the meatus.

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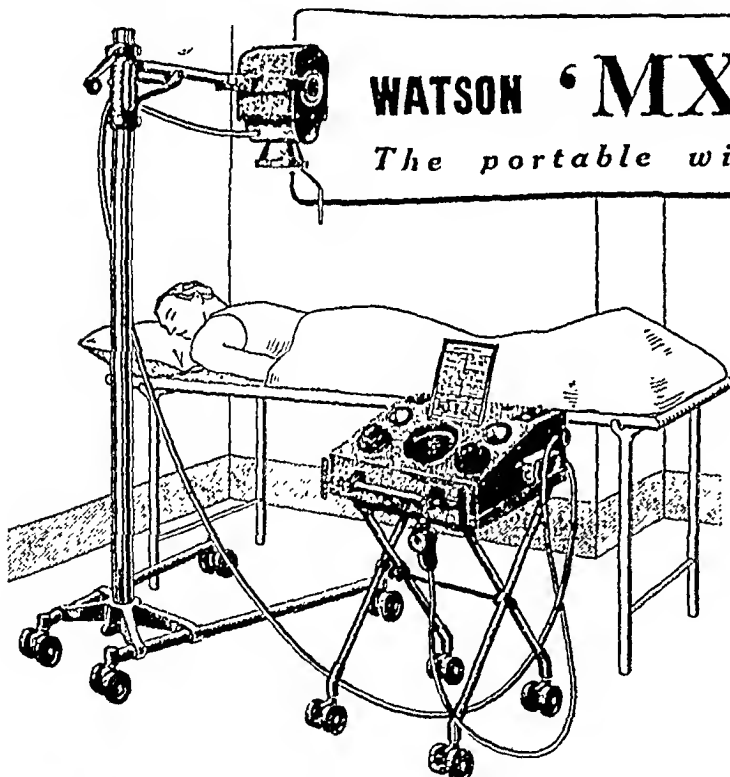
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Indian Medical Gazette

MARCH

MEDICAL MEN IN INDIA : TOO FEW OR TOO MANY

SUCH are the considered opinions of committees and officials after reviewing the situation from the point of view of health and new appointments.

Those who hold that India lacks medical men.—They quote European and American figures. In India there is 1 medical man to 6,000 people while in England there is 1 medical man to 1,000 people and in America 1 medical man to 750 people. Apparently nothing contradictory could be advanced against such a powerful array of figures. The good intentions of Bhore's report are based on the evidence of such figures (Bhore, 1946).

Those who hold that India has a surplus of medical men.—They are : (1) Administrative medical men who have to turn down sometimes dozens of medical men for a single, small and temporary appointment. (2) Teachers in post-graduate institutions who supply the eager recipients with extra doses of knowledge for additional letters of qualifications after their names. The ordinary qualification has been weighed by their pupils and found wanting. Such is the competition in an overcrowded profession. (3) Ordinary citizens in large towns like Calcutta who see so many young men past the student age and middle-aged men with stethoscopes round their necks, overcrowding buses and tramcars, at all hours of the day. (4) Those who ran military hospitals during the first half of the last war. As soon as the pay improved difficulties in the military medical service began to disappear remarkably rapidly, at least numerically. This enormous number of medical men left behind in civil practice, in towns, colleagues whose financial condition improved obviously. (Alas ! it is sliding back already. The accumulated wealth has been spent on births, marriages and deaths mostly and has failed to raise the standard of living permanently.)

Towns are overcrowded by medical men.—Such is the real state of affairs. The overcrowding is lowering the standard of living of and consequently interfering with the acquisition of professional efficiency by the majority of medical men in practice in towns. The town population is naturally losing faith in such medical men. The patients would rather go to some one 'in service' who can hardly attend to

them. The Western system of medicine is blamed. The half-starved private practitioner tightens his belt and further reduces his standard of living and efficiency : the vicious cycle is complete and gathers speed year by year.

The countryside has very few medical men.—In rural areas private medical practitioners are rare. Even government dispensaries are very few and they do not work to their full capacity. The staff idles half the time. If more dispensaries were opened the idleness would be increased proportionately. The reasons for this state of affairs, which can only be seen by the sons of the country who have worked in and out of the country, are : (1) The system of Western medicine, without modifications, does not suit the rural masses. Symptomatology which is subjective and based entirely on the outlook, imagination and psychology of the simple folk brought up on simple centuries old lore is the chief difficulty. The physician has not read of 'circles', 'tightness of the heart' and 'twists of the rope', while the patient has not heard of 'biliousness', 'heartburn' and 'nerves'. Even leading questions fail. The paralysis of anti-rabies treatment was not recognized in India for a long time, mostly because the complaint-cards received could not be interpreted (Greval, 1936). Another difficulty is the palate. Flavours (flavour of bitter almonds, for instance) and tastes (taste of bitters, for instance) regarded pleasant by most Europeans nauseate most Indians. The sight also plays a part. Small quantities of mixtures (implying concentration of 'sharp' and 'hot' drugs) tinged with colours not encountered in daily food and drink do not appeal. Decoctions, infusions, confections, syrups, powders and pills, of suitable colour, flavour and taste will be more acceptable. The last though not the least difficulty is the cost of the treatment. Drugs manufactured in Europe and America by highly paid labour cannot be purchased by a population subsisting on the lowest possible income. The dispensing needs careful control if the effective dose of an expensive drug is to be given free. (2) The fee charged by medical men is exorbitant compared to the fee charged by an ordinary English practitioner in England and an equally ordinary *hakim* in India. The former charges (pre-World War II scale) one shilling in his surgery. The shilling consists of 12 buying units in England. In India 12 buying units are 12 pice (pre-World War II scale) which equals 3 annas. Any charge over 4 annas is excessive. The minimal fee accepted in India is Re. 1 to which the ordinary medical man is not entitled in equity and which is exorbitant. Of 4 annas he will probably collect 10 to 20 in a day in a rural population, in addition to what he receives in kind which every medical man receives in English country practice. Besides, he will live in his own house and grow his own food. (Every man owns a house somewhere or other in India.) The crowning glory of his career, when he succeeds, will

be the fact that he would be a 'social physician protecting the people and guarding them to a healthier and happier life' of Bhowe's report. He will then succeed where administrators have failed since Akbar's time if not Asoka's. He will give a new outlook to the masses. He may come to a town when he can afford it, if he has the urge. (3) Paid posts are the objective of the would-be medical men, not an interest in the medical profession itself. That is why the cry for an M.B. is so loud by those possessing an L.M.S. or L.M.P. What is wrong with L.M.S. or L.M.P.? There are three qualifications in England also. Once the knowledge has been acquired it can be perfected only in practice. Would it not be a good idea for many to acquire the knowledge quickly? They could even do so in their own mother tongue. There is an advantage in separating the essential from the non-essential under certain circumstances. Higher qualifications of some type or other and diplomas in specialities can be made available to all as they are in England. The rest will lie with the man. He is to be essentially a man with a profession, not a job hunter.

The method of admission of students may go far towards restoring the balance.—While in countries without caste the medical profession is becoming a caste, in caste controlled India the profession of medicine is not being handed over from father to son, as it should be. The responsibility lies with the authorities controlling medical education. Places in examination in pre-medical education are not a sound criterion of the suitability of the candidate. The admission should be by the place in the examination plus an interview and the interview should be important. Such is the contemporary English opinion also (Smyth, 1946; Editorial, *B.M.J.*, 1946). A medical man's sons and daughters should not fail to get in. They have grown up in a medical atmosphere and are not only in possession of its etiquette and tradition as applied to Indian soil but also have business interests and connections. For them there will be a place to make themselves useful anywhere, town or country. They and only they can change the outlook of the masses who under the influence of a strange blend of fatalism, ignorance and arrogance, born of centuries old frustrations and hardships of life, do not want medical men trained in the Western system of medicine. This outlook together with the fact that the system has not been modified to suit the masses makes the majority of medical men in India unwanted.

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Old Tales Retold With Fresh Comments

OATH OF HIPPOCRATES

From *Encyclopædia Britannica*, 1938, 14th Edition, Vol. 15, p. 198

I WILL look upon him who shall have taught me this Art even as one of my parents. I will share my substance with him, and I will supply his necessities, if he be in need. I will regard his offspring even as my own brethren, and I will teach them this Art, if they would learn it, without fee or covenant. I will impart this Art by precept, by lecture and by every mode of teaching, not only to my own sons but to the sons of him who has taught me, and to disciples bound by covenant and oath, according to the Law of Medicine.

The regimen I adopt shall be for the benefit of my patients according to my ability and judgment, and not for their hurt or for any wrong. I will give no deadly drug to any, though it be asked of me, nor will I counsel such, and especially I will not aid a woman to procure abortion. Whatsoever house I enter, there will I go for the benefit of the sick, refraining from all wrong-doing or corruption, and specially from any act of seduction, of male or female, of bond or free. Whatsoever things I see or hear concerning the life of men, in my attendance on the sick or even apart therefrom, which ought not to be noised abroad, I will keep silence thereon, counting such things to be as sacred secrets.

From *Medical Journal of Australia*, Vol. I, 22nd June, 1946, p. 877—Francis Adam's translation

I SWEAR by Apollo the physician, and Æsculapius, and Health, and All-heal, and all the gods and goddesses, that, according to my ability and judgment, I will keep this Oath and this stipulation—to reckon him who taught me this Art equally dear to me as my parents, to share my substance with him, and relieve his necessities if required; to look upon his offspring in the same footing as my own brothers, and to teach them this Art, if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and every other mode of instruction, I will impart a knowledge of the Art to my own sons, and those of my teachers, and to disciples bound by a stipulation and oath according to the law of medicine, but to none others. I will follow that system of regimen which, according to my ability and judgment, I consider for the benefit of my patients, and abstain from whatever is deleterious and mischievous. I will give no deadly medicine to anyone if asked, nor suggest any such counsel; and in like manner I will not give to a woman a pessary to produce abortion. With purity and with holiness I will pass my life and practice my Art. I will not cut persons labouring under the stone, but will leave this to be done by men

who are practitioners of this work. Into whatever houses I enter, I will go into them for the benefit of the sick, and will abstain from every voluntary act of mischief and corruption; and, further, from the seduction of females or males, of freemen and slaves. Whatever, in connection with my professional practice or not in connection with it, I see or hear, in the life of men, which ought not be spoken of abroad, I will not divulge, as reckoning that all such should be kept secret. While I continue to keep this Oath unviolated, may it be granted to me to enjoy life and the practice of the Art, respected by all men, in all times! But should I trespass and violate this Oath, may the reverse be my lot!

Observations are necessary on three points: (1) Lack of co-operation between medicine and surgery—such as it was in those days. (2) Lack of co-operation between colleagues. (3) Prevalence of a social conduct of which other nations did not approve and which must be called a failing. In this connection the following account from *Lyon's Medical Jurisprudence*, 10th edition (in the press) will be of interest:—

Homosexuality amongst males was a well-recognized practice in ancient Greece.

'Personal affection was not the basis of married life; romance took a different form, that of passionate friendships between men. Such friendships among the Greeks were an institution. Their ideal was the development and education of the younger by the older man, and they were recognized and approved by custom and law as an important factor in the state. In Sparta, for example, it was the rule that every boy had attached to him some elder youth by whom he was constantly attended, admonished and trained. The celebrated "Theban band", consisting exclusively of pairs of lovers, marched and fought in battle side by side, and by their presence and example inspired one another to a courage so constant and high that "it is stated that they were never beaten until the battle of Chaeronea, and when Philip, after the fight, came to the place where the three hundred lay dead together, he wondered, and understanding that it was the band of lovers, he shed tears" (Plutarch, Pelopidas, ch. 18). Greek legend and history resound with the praises of friends, names that recall at once all that is most romantic in the passion of Greece. Not only, nor primarily, the physical sense was touched, but mainly and in chief the imagination and intellect. The affection of Achilles for Patroclus is as intense as that of a lover for his mistress (Iliad, XXIV). It was his insistence on friendship as an incentive to a noble life that was the secret of the power of Socrates. So much, indeed, were the Greeks impressed with the manliness of this passion, with its power to prompt to high thought and heroic action, that some of the best of them set the love of

man for man above that of man for woman. It is in the works of Plato that this view is most completely and exquisitely set forth; among all the forms of love, that one is chief which is conceived by one man for another. Such a love is the initiation into the higher life, the spring at once of virtue, of philosophy, and of religion. That there was another side to the matter goes without saying. This passion, like any other, has its depths as well as its heights. Still the fact remains that it was friendship of this kind that supplied to the Greeks that element of romance which plays so large a part in modern life: and it is to this, and not to the relations between men and women, that we must look for the highest reaches of their emotional experience' (Stanley-Jones, D., *Medical Press and Circular*, June 12th, 1946; an abstract from *The Greek View of Life* by Dickinson, G. L., 19th edition).

While the Greeks made no problem of this difficult question their Hebrew neighbours across the Mediterranean thought otherwise. In the mist of antiquity '... the Lord rained upon Sodom and upon Gomorrah brimstone and fire' (Genesis 19, 24), because their sin was 'very grievous' (Genesis 18, 20).

Very early in the Christian era St. Paul deplors the prevalence of the sin amongst the Romans who '.... leaving the natural use of the woman, burned in their lust one towards another; men with men working that which is unseemly,' (The Epistle of Paul the Apostle to the Romans, 1, 27).

Medical News

THE PLACE OF CANCER IN THE MEDICAL SCHOOL CURRICULUM

TWENTY-FOUR physicians representing 14 medical schools are meeting on 7th November with the National Advisory Cancer Council to plan an attack on cancer from the angle of medical education.

In announcing the meeting, which is being held at the National Cancer Institute in Bethesda, Maryland, Dr. Thomas Parran, Surgeon-General of the U.S. Public Health Service, said that these men are members of a special committee appointed to advise the Council concerning the place of cancer in the medical school curriculum. The disease now ranks second as a cause of death in this country.

The appointment of this committee is a step forward in putting into operation one phase of the accelerated cancer-control programme outlined last spring by the Committee on Cancer Facilities and Services of the National Advisory Cancer Council. The proposed programme would include more comprehensive and better integrated courses in cancer at medical schools.

Dr. Frank E. Adair, member of the National Advisory Cancer Council, heads the new committee. Dr. Adair is president of the American Cancer Society and Professor of Surgery, Cornell University Medical College.

Members of the Committee include:—

Chicago, Illinois

Dr. Roland W. Harrison, Dean, Division of Biological Sciences, University of Chicago.

- Dr. Charles B. Huggins, Professor of Surgery, University of Chicago Medical School.
 Dr. A. C. Ivy, Acting Dean, University of Illinois College of Medicine.
 Dr. J. R. Miller, Dean, Northwestern University School of Medicine.
New Orleans, Louisiana
 Dr. M. E. Lapham, Dean, Tulane University School of Medicine.
 Dr. Edward W. A. Ochsner, Professor of Surgery, Tulane University School of Medicine.
New York, New York
 Dr. Joseph C. Hinsey, Dean, Cornell University Medical College.
 Dr. Willard Cole Reppleye, Dean, College of Physicians and Surgeons, Columbia University.
 Dr. Currier McEwen, Dean, New York University College of Medicine.
 Dr. John H. Mulholland, Professor of Surgery, New York University College of Medicine.
 Dr. George H. Humphreys II, Professor of Surgery, College of Physicians and Surgeons, Columbia University.
Boston, Massachusetts
 Dr. Grantley W. Taylor, Professor of Surgery, Harvard University Medical School.
Minneapolis, Minnesota
 Dr. Harold S. Diehl, Dean, Medical School, University of Minnesota, Minneapolis.
 Dr. Owen H. Wangenstein, Professor of Surgery, Medical School, University of Minnesota, Minneapolis.
Madison, Wisconsin
 Dr. Wm. D. Stovall, Professor of Hygiene, University of Wisconsin.
 Dr. Erwin R. Schmidt, Professor of Surgery, School of Medicine, University of Wisconsin.
New Haven, Connecticut
 Dr. Milton C. Winternitz, Professor of Pathology, Yale University School of Medicine.
 Dr. George M. Smith, Executive Director, National Advisory Cancer Council. Address: Yale University School of Medicine.
San Francisco, California
 Dr. Francis S. Smyth, Dean, University of California Medical School, San Francisco.
 Dr. H. Glenn Bell, Assoc. Professor of Surgery, University of California Medical School.
 Dr. Emile Holman, Professor of Surgery, Stanford University School of Medicine.
Emory University, Georgia
 Dr. Daniel C. Elkin, Professor of Surgery, Medical School, Emory University.
Washington, D. C.
 Dr. Lewis H. Weed, Chairman, Division of Medical Sciences, National Research Council.

CALCUTTA SCHOOL OF TROPICAL MEDICINE. TWELFTH CLINICAL MEETING HELD ON 4TH DECEMBER, 1946

Dr. GODREJ S. KARAI demonstrated a case of carcinoma rectum in a Hindu male aged 52 years. A perineo-abdominal procto-sigmoidectomy had been performed in this case by Major A. T. Andreasen two months ago. The case was admitted in an emaciated condition weighing only 5 stones 11 pounds, complaining of increasing constipation for 5 months and pain in the rectum particularly during defaecation for 3 months. Pain was local, with reference occasionally to the gluteal and sacral regions; hæmorrhage was an infrequent symptom during defaecation. He had been treated medicinally for hæmorrhoids.

Rectal examination showed the presence of a firm, annular tumour mass around the walls of the rectum, about 2½ inches from the anal margin. Its upper border could not be reached; its lower border presented a rolled up ragged edge, firm and nodular in parts. Red cell count 4.3 millions, hæmoglobin 80 per cent (Sahli); white cells 6,300, polymorphs 65 per cent; total plasma

proteins 4.14 per cent, albumin-globulin ratio 1.86/2.28. Two stool examinations showed red cells in fair numbers, no amœbæ. Inguinal lymph glands were not enlarged and liver and spleen not palpable.

On a diagnosis of carcinoma rectum (ampulla) a left inguinal colostomy was opened two days after admission. Light spinal percaïne 16 c.c. and intravenous drip sodium pentothal (induced with 5 per cent solution and maintained with 2 per cent) were given for anaesthesia. The lower end of the left ureter was scarified during operation because of extension of the growth around it. The pathological specimen prepared by Dr. R. N. Chaudhuri showed a large ulcerating growth of the rectum about 2½ inches from the anal margin and 4 × 2 inches in size. The floor was deeply ulcerated and bleeding, margins rolled up and surrounding area indurated. It was graded as class C (Cuthbert Duke), i.e. involvement of the muscular and peri-rectal fascia, but no involvement extensively in the local lymph glands.

Radium implantation via a rubber tube anchored in the lumen of the rectum was unsuccessful. Dressing twice a day of the colostomy opening, wash-outs of the excluded lower bowel segment and rectum with tepid normal saline and instillation of 4 oz. olive oil via the colostomy were the important points in the maintenance and care of the colostomy (primary). A low residue, high protein diet was supplied and two full courses of sulphasuxidine were administered.

Major Andreasen pointed out that the fears of the profession regarding the mortality from such operations were out of proportion to the facts. In the best hands class C and D cases (Cuthbert Duke) had an immediate operative mortality of 12-15 per cent, while class A tumours had a recovery and absence of recurrence in a 5-year period of over 80 per cent. He stressed the importance of early recognition and treatment in all such cases. The abdominal wound usually closes well in spite of the adjacent colostomy, and the perineal aspect takes approximately 80 days for the cavity to granulate up to the surface if dressed by the occlusive technique.

In replying to Dr. Panja's query as to the differentiation of these tumours from amœbomas, he stressed the more important need of recognizing the carcinoma and giving the patient the benefit of early radical surgery. Suspicious cases should be given the advantage of frequent stool examinations, biopsy and sigmoidoscopic examination besides thorough clinical examination. The finding of a tumour with *E. histolytica* in the stool is no criterion for a diagnosis of amœboma; the dangerous malignant growth must be proved absent before such a diagnosis can be entertained.

Dr. C. R. Das Gupta described a case of Cooley's anaemia. The patient was a Hindu female child in Bengal of Bengali parents. The child was reported to have been suffering from intermittent fever off and on, and progressive anaemia not responding to treatment for over one year. Clinically, the patient looked very pale with characteristic mongoloid facies with a big head and had a protuberant abdomen. The spleen was greatly enlarged about 6 inches and was firm. The liver was also enlarged about 2 inches. Systolic bruit could be heard over the mitral and pulmonary areas of the heart. There were scattered rhonchi over both the lungs. Examination of the blood showed hypochromic anaemia of moderate degree. The blood smear showed numerous immature cells, mostly normoblasts and a few neutrophil myelocytes, but careful examination failed to show any 'target cells'. The red cells did not show any increased resistance to hypotonic saline. Sternal marrow was cellular with preponderance of normoblasts. Radiologically the skull bones presented vertical striations characteristic of Cooley's anaemia. Treatment with iron for over 30 days showed only slight improvement in the blood counts and the blood picture continued to be hypochromic. The number of immature cells in the peripheral blood did not show any diminution.

Dr. N. V. Bhaduri described a case of dracontiasis in a Punjabi Mohammedan male aged 40. The patient visited his native place, an endemic area, about a year and a half ago. Towards the end of October 1946 one night he had an attack of urticaria in the right leg followed by loose stools. The next morning his symptoms disappeared but a blister appeared in the lower part of his right leg. Two days later a guinea-worm appeared through the blister; later on another ulcer appeared on the dorsum of the same foot through which three more worms came out after which there was complete abatement of symptoms. X-ray examination of the leg showed the presence of a calcified worm.

Dr. R. N. Chaudhuri gave an account of treatment of malaria with paludrine in a series of 43 cases. The following regimes of treatment were tried: I. One tablet (100 mg.) three times a day for four days. II. A single dose of 3 tablets. III. A single dose of one tablet. Charts showing the effects of the drug on the temperature and parasites were demonstrated. These indicated that the average effect of treatment with all the regimes considered together was to bring (1) the temperature to normal in 53 per cent of the cases in 3 days and in 95 per cent cases in 4 days, and (2) to cause disappearance of parasites in 67 per cent in 3 days and in 93 per cent in 4 days. Gametocytes, especially the crescents, remained unaffected. In two cases of falciparum malaria schizonts were seen in the peripheral blood after paludrine administration. As regards relapses, quarter of the cases of single dose treatment relapsed within three weeks while none of those treated with 12 tablets relapsed during this period of observation in the hospital. Two patients treated with single doses were subsequently given one tablet weekly for six weeks and they had remained well so far. No untoward symptom or evidence of idiosyncrasy was encountered. One patient, a woman, was six months' pregnant with severe anaemia and had paludrine treatment without any side effects.

FUNCTIONAL DESIGN OF AUSTRALIAN HOSPITALS

(Australian Medical Newsletter No. MNL/III)

FUNCTIONAL design in Australian architecture is best exemplified in the country's hospitals, which are claimed to be equal to the finest in the world. This article deals with three in the State of New South Wales.

Sydney architect and town planner Walter Bunning said recently: 'Hospitals are probably the only branch of our architecture about which such a claim could be made. The reason undoubtedly is that more research is made in the hospital field than in any other, and that it is the only field in which scientific planning dominates the desire to be romantic, and to imitate the glories of the past.'

'Even that most functional of all structures, the factory, is generally cloaked by a massive, pretentious facade on the main street, as though ashamed of its function. Cinemas and places of amusement are dressed up in cheap vulgar fancy dress. However, the hospital is looked upon rather as a laboratory, where one is made well, and the result is a clean, efficient-looking building.'

Mr. Bunning gives as an example of such a building the Rachel Forster Hospital, which was built to the design of Sydney architects Leighton Irwin and Co., and opened in 1942 in the Sydney suburb of Redfern.

This hospital is an excellent example of scientific planning. The vertical slab-like ward block is kept to one edge of the site, leaving freedom for air to circulate around the block, besides creating a sense of space. The outside appearance is cheerful, light and airy. The hospital's clean-cut lines impart an air of hygiene, and the white edges to the balconies and windows create much the same effect as white collars and cuffs to nurses' uniforms.

The noted French painter, Ozenfant, once said 'buildings need white collars'.

The outside treatment of the building depends for its effect of dignity and formality on the relation

between the long horizontal balcony lines of the ward-block and the slender vertical columns of the administration block, which is at right angles to it.

The balconies of the ward-block end in a concrete slab, brilliant white on the edge, matching the edges of the balconies themselves, which are grey-blue on the underside. The end wall of the ward-block is soft red brickwork, relieved by a surface sub-division into large square panels by recessing lines of brickwork.

Kitchen arrangements have been so designed that the food is received at the goods entrance, prepared and served, without once recrossing its tracks. Food lifts take it to the ward pantries.

Inside the hospital cheerful colours contrast with soft greys.

George V Memorial

Another hospital of which Sydney is proud is the King George V Memorial Hospital for Mothers and Babies, at Camperdown.

Designed by architects Stephenson and Turner, this hospital cost £(A)310,000 (Rs. 33,19,480) to build and £(A)45,000 (Rs. 4,86,860) to equip. The foundation stone was laid in 1939, and the official opening ceremony was performed in May 1941.

The hospital has long sun balconies running the length of the front facade. Built in cream bricks, it is decorated on either side of the facade with blue and cream panels of conventionalized designs of a mother and child. A strikingly modern entrance porch is supported by rich blue pillars of porcelain enamel.

The building is divided into obstetric and gynaecological sections horizontally and vertically. The third floor contains all operating and sterilizing services and investigation and examination clinics. Above this floor are the private wards, below it the public wards.

Colour schemes that alternate through the floors are blue and cream, grey-green and cream and rust and cream.

Among modern features are silent electric light switches in every ward, air-conditioned basinettes for the babies, dumb-waiters (trays on wheels) to bring meals straight up from the kitchens to the wards, and an operating theatre with domed ceiling of reflecting steel for indirect lighting on to the operating table, and with observation slits to allow students to watch through the ceiling.

All beds are nickelled to save repainting, and in most wards all the drawers in the furniture are swung out on swivels. Picture rails are an inset line in the wall. No sharp corners are allowed anywhere, even the sides of doorways being rounded.

New Military Design

At Concord West, Sydney, is the 113th Australian General Hospital, which presages a new era in military hospital design.

Gone is the customary severe and barrack-like building for the treatment and convalescence of soldiers. In its place is a hospital featuring the most advanced designs and equipment.

Stephenson and Turner also designed this hospital. The main way in which it differs from past military hospitals is that all the accommodation is grouped in large multi-storied buildings instead of being dispersed into numerous one-storied pavilions. These awkward structures used to be spread all over the site, linked by rambling corridors.

The Concord Hospital, completed in 1942 after only two years' building, has compact high blocks with vertical communication by high-speed lifts instead of slow horizontal foot traffic. The site is spacious, and instead of a lot of untidy huts there are broad sweeps of lawn, gardens and trees.

The main 7 storey ward-block is planned on an aeroplane-like shape. Subsidiary buildings have been grouped to increase the effect of mass and assertion. Wards open on to sunny balconies partly protected by glazed screens against the wind. From the outside these screens of glass, rising storey on storey, resemble a great laboratory.

SPECIALIST TRAINING FOR DOCTORS

By L. E. SESSEL

(Reprinted from the leaflet dated 20th January, 1947, published by the United Kingdom Publicity Services, New Delhi)

Doctors in Britain are to be enabled to enlarge their professional knowledge and improve their skill on more systematic lines than hitherto. Both specialists and general practitioners will benefit by the opportunities available.

With this object the British Postgraduate Medical Federation has been created in the capital as a 'school' of the University of London. Its purpose is to provide in London organized and correlated facilities for postgraduate teaching and research for qualified medical practitioners of the United Kingdom and from overseas countries, and to co-operate with other universities and medical schools similarly engaged.

Sir Francis R. Fraser, a distinguished physician, is the first Director of the Federation, which at once becomes the foremost institution of its kind in the United Kingdom. In a recent paper he read at Edinburgh, which bears a high reputation everywhere as a centre of medical training, he discussed the suitability of London not only as a centre of education for British doctors but as an international school to which numbers of foreign medicos would desire to proceed.

Postgraduate Education

Postgraduate medical education has, of course, existed as long as the profession of medicine, but it has engaged serious attention in Britain in organized form only since the beginning of the century. Obviously it is essential for specialists, and it is hardly less desirable for the general practitioner though the public's daily calls on his services, either as private or 'panel' (i.e. medical insurance) patients, often make it more difficult for him to find time for postgraduate study.

London has had its British Postgraduate Medical School at Hammersmith in the suburbs since 1935. It has done very useful work, canalizing effort in the capital and the Home Counties. Facilities there and on a smaller scale elsewhere are now to be extended under the direction of the new Postgraduate Medical Federation. Preferential consideration will generally be given to British ex-Service doctors in the first instance who are bent on additional medical education; but, with the satisfaction of these requests, the door will be freely open to doctors from other countries, many of whom are anxious to put in a course of study in London at the present time.

Comprehensive Field

The Federation will provide (i) training for prospective specialists, supplementing the work of the undergraduate medical schools, (ii) advanced revision for practising specialists, (iii) instruction for medical practitioners who, though not specialists, desire more detailed knowledge of any branch of medicine, and (iv) instruction for general practitioners. A pretty comprehensive field of activities is thus embraced.

It will include the departments of general medicine, general surgery, obstetrics and gynaecology, and pathology of the existing Hammersmith Postgraduate School, also the institutes associated with several London hospitals which specialize in the treatment of sick children, diseases of the nervous system, and throat, nose, ear and eye troubles. It is hoped to include an institute of psychiatry in the immediate future.

Expansion Programme

Associated with the Federation in providing postgraduate education are the teaching schools of many other important hospitals, which concentrate on the treatment of diseases of the skin, of tuberculosis and the chest, heart, genito-urinary and orthopaedic troubles. These schools are being expanded and developed as circumstances permit in order to include them as federated institutes in due course.

All these establishments are in London, which is far better equipped for postgraduate medical education

than any other centre in Britain. It shelters 12 great voluntary hospitals associated at present with undergraduate medical schools, 30 other large voluntary hospitals and innumerable smaller ones, special hospitals in every branch of medicine, and the largest and most efficient local authority hospital system in the world. It presents an unrivalled field for observation and study.

In the opinion of the Director of the Federation the ideal arrangement in London would be a general hospital and postgraduate medical school with specialist hospitals grouped around it, constituting a postgraduate medical centre. There would be residential accommodation and other amenities, together with proper administrative offices. These desirable objects are, however, unattainable at present, especially in view of post-war building and other problems. But the idea has not been abandoned, and an influential committee is considering what parts of the proposed centre should be completed first in order that the requirements of visiting graduates expected from overseas to take up courses may be met.

Hospital Appointments

Reference has been made to the facilities that are to be extended in the first instance to ex-Service doctors. This arises from a government scheme of assistance. They are being given hospital appointments for a period of six months in which to refresh their knowledge of various branches of medicine, and these appointments are extended for further periods for doctors selected for training as specialists.

The hospitals have been asked by the Ministry of Health to create some wholetime appointments for those whose specialist training is completed, as distinct from the honorary appointments hitherto held by trained specialists who attend the hospitals and deal with new variabilities in disease that constantly attract expert attention. The wholetime appointments will be made in anticipation of the coming into force of the important National Health Service Act in April 1948.

PLASTIC SURGERY GROWS UP

By L. E. SESSEL

(Reprinted from leaflet No. F.372, dated the 10th February, 1947, issued by the United Kingdom Publicity Services, New Delhi)

'Plastic surgery has suddenly grown up.' That was said by Mr. Archibald H. McIndoe, Consulting Plastic Surgeon to the Royal Air Force and Surgeon-in-Charge of the Maxillo-Facial Unit at the celebrated East Grinstead Centre, when addressing the Professional Nurses and Midwives Conference in London in December 1946.

The great progress in this field of surgical work is very largely attributable to the experiences of the two World Wars. Little was known or had been heard of plastic surgery in 1914. There were no plastic surgeons then and no particular likelihood of there being any. To-day, the situation is quite different. The almost incredible achievements of pioneers in their treatment of severe facial and other bodily injuries, particularly those caused in war, have become far more widely appreciated, and steps to meet the need for specialists, accommodation and equipment are being taken.

Great advances have taken place in Britain. At Queen Victoria Hospital at East Grinstead, Sussex, some 30 miles from London, there is a special centre where ex-Servicemen, especially airmen of Allied Forces during the Second World War, have received treatment demanding the highest degree of skill. Many of these cases are still being treated.

£97,000 Extension

During the war the Canadian Government, in token of gratitude for the care bestowed on their nationals at East Grinstead, added a wing to the centre, and in July 1946, Queen Elizabeth formally opened another

addition there, provided and paid for by Americans at a cost of £97,000. Its equipment is unsurpassed in any country.

This development in the field of plastic surgery in the past 30 years was authoritatively surveyed in his London lecture by Mr. McIndoe. He showed how the sudden urgent demand for plastic surgeons arose in 1916 owing to the flood of facial injuries, the special by-product of static trench warfare. At that time armies of men lay in concealment at close quarters, taking pot shots at every head or face that dared to show itself. That explained how as many as a thousand facially injured men went in one home-bound convoy urgently demanding skilful treatment.

With so many cases of the kind crowding in, a special centre was established at Sidcup, Kent, on the southern outskirts of London. 'At that centre, by trial and error, the principles of facial restoration and eventually of plastic surgery were laid down', said Mr. McIndoe.

Outstanding Pioneers

Two great reputations were made there—those of Sir Harold Gillies, now Plastic Surgeon at St. Bartholomew's, the famous 800-year-old hospital in the City of London, and Professor T. P. Kilner. They are the two outstanding pioneers of plastic surgery in Britain and possibly in the world. Gillies was elected first President of the Association of Plastic Surgeons formed in November 1946, with the assistance of the Royal College of Surgeons, while Kilner is the first Professor of Plastic Surgery at the University of Oxford established under the Nuffield Trust—a clear indication of the importance now attached to this specialized branch.

Plastic surgery became rather friendless when Sidcup, which had been fathered by the Red Cross, closed down after the first World War, having fulfilled its wartime purpose. Not a single teaching hospital had or wanted a plastic surgeon attached to its staff and only one non-teaching hospital provided beds.

But Gillies and Kilner persisted in the face of every obstacle in the task of defining and creating the field of plastic surgery in relation to civilian life. Briefly, the field included: (1) all kinds of injuries and deformities to the face resulting from accident and disease; (2) injuries of soft tissues in all other parts of the body, especially where losses of skin involved skin grafting. Finally, there is the whole field of congenital defects, such as cleft lip and palate among many others.

First Teaching Hospital

St. Bartholomew's was the first teaching hospital to recognize the importance of the subject when it appointed a plastic surgeon to its staff in 1935. Two other leading London hospitals followed the lead as well as half-a-dozen non-teaching hospitals, and by the end of 1939, there were four or five fully trained plastic surgeons. Fortunately—for the second World War had started—there were another 12 to 15 partially trained. But facilities for the surgeon and for the nursing of the cases were usually inadequate.

East Grinstead is gratefully remembered by thousands of Servicemen of all nations for its invaluable services during World War II. Whereas in the 1914-18 war the patients were chiefly army men, those of 1939-45 largely belonged to the air forces, airmen who were often shockingly burnt when their machines were shot down. The attention and skill bestowed on their terrible injuries have made new men of many of them physically and, by abolishing their former self-consciousness about their appearance, mentally.

The demand for wartime services is naturally diminished, but plastic surgery has no less important a place to fill under peacetime conditions. It has been estimated that to run a satisfactory service throughout Britain approximately 15 units of 100 beds would be required. With regard to the nursing of these plastic surgery cases, Mr. McIndoe has suggested that nurses

should be able to qualify for a special certificate, such as they can now obtain for midwifery, fever, orthopaedic, tuberculosis and mental training.

COMMITTEE TO CONSIDER THE CLAIMS OF THE INDIGENOUS SYSTEMS OF MEDICINE

At the Health Ministers Conference held in December 1947 at New Delhi, it was resolved that adequate provision be made at the centre as well as in the provinces for training and research in the indigenous systems of medicine and for the application of scientific methods for the investigation of those systems. In pursuance of that resolution, the Government of India have appointed a committee of representatives of the Ayurvedic systems of medicine and a system of medicine to consider the question in all its aspects and recommend steps that should be taken to improve facilities for research and training in indigenous systems of medicine with a view generally to increase their usefulness to the public. The personnel of the committee are Sir Ram Nath Chopra, Chairman; Vaid—Dr. A. Lakshminpathi (Madras), Dr. Balkrishna Chintaman (Bombay), Dr. B. A. Pathak (Benares); Hakims—Hakim Habibur Rahman (Dacca), Hakim Mohammad Hazzan Qureshi (Lahore), Hakim Nasiruddin Ahmad Khan (Delhi); Doctors—Major M. H. Shah, I.M.S., Superintendent, Irwin Hospital, Delhi, and Dr. B. N. Ghosh, Professor of Pharmacology, Carmichael Medical College, Calcutta.

The committee has already convened its first meeting on the 22nd March, 1947, at the Council House, New Delhi. This meeting will be opened by the Hon'ble Member in charge of the Health Department, Mr. Gazanfar Ali Khan.

CENTRAL DRUGS LABORATORY (GOVERNMENT OF INDIA), CALCUTTA

With effect from 1st February, 1947, the Government of India have decided to convert the existing Biochemical Standardization Laboratory at the All-India Institute of Hygiene and Public Health, Calcutta, into the Central Drugs Laboratory and has authorized this laboratory to perform the functions of the Central Drugs Laboratory under Section 6(1) of the Drugs Act, 1940. It is proposed to enforce this Act from 1st April, 1947.

Under the Drugs Act, 1940, the functions of the Central Drugs Laboratory will be as follows:—

- (a) To analyse and test samples sent to the laboratory on the provisions of the Act and the Rules thereunder by Customs-Collectors and Courts of Law.
- (b) To grant certificates of registration for patent and proprietary medicines with undisclosed formulae, and
- (c) To carry out such other duties and functions as entrusted by the Central Government.

Dr. B. Mukerji, M.D., D.Sc., F.N.I., officiating Director of the Biochemical Standardization Laboratory since 1941, has been appointed Director of the Central Drugs Laboratory with effect from 1st February, 1947. After graduating in 1927 from the Calcutta University Dr. Mukerji joined the Calcutta School of Tropical Medicine in 1928 as assistant research worker to Sir R. N. Chopra. He has been associated with the drug control movement since 1930 when he served as assistant secretary to the Drugs Enquiry Committee. In 1933 he was awarded the Rockefeller Foundation scholarship and he studied modern methods of pharmacological and biochemical research in America and Great Britain. Dr. Mukerji is a member of the American Society for Pharmacology and Experimental Therapeutics, of the Swiss Medical and Biological Society and of the editorial committee of the Indian Pharmacopoeial List.

Public Health Section

NOTE ON INDUSTRIAL CANTEENS
IN CENTRAL PROVINCES

By D. M. ROY

*Nutrition Officer and Additional Inspector of Factories,
Canteens, Central Provinces and Berar*

Introductory: Origin of canteens.—Canteens were originally purely a military concern, but they have been a feature of wartime Britain where the economical distribution of food supplies, the need to help workmen to stick to their jobs in heavily bombed areas and the opportunities which such canteens provide for introducing the alternative diets dictated by rationing have all influenced government in its policy of promoting the setting up of canteens. Most important was the need to give special classes of the population special allowances of food. This could only be done without upsetting the whole ration card system and supply supplements at canteens reserved for special categories of the population (heavy industrial labourers' school, etc.).

Need of a canteen.—It has long been realized that poor feeding is one of the chief causes of high mortality and morbidity and low efficiency in labour in this country. Proper feeding, proper housing, proper hygiene and proper attention to the habits and customs of the labourer: these are as important as questions relating to hours of work and rates of pay in securing a contented and efficient labour force, and of these proper feeding is certainly not the least important.

Under present-day conditions of employment it is necessary for a great number of workers to live at a distance from their work so that they cannot afford either the time or the money to return home for a mid-day meal. They carry food with them which is neither balanced nor hygienic or they must take their meals at a neighbouring restaurant or tea-stall which is more expensive, at the same time ill-balanced. An industrial canteen run by the employer on a non-profit basis will provide better food with less money under conditions that are not possible elsewhere. The chance of rest in a bright and cheerful environment with opportunities of meeting friends and talking is welcomed as a complete break and relaxation during the working day. Besides supplying a balanced and nutritious food to the worker it teaches the worker what is a scientific diet and what things are necessary from a nutritional point of view which will greatly influence his dietary at home and in his family.

Industrialists in Europe and America have developed canteens to a high degree of perfection: What have we achieved in this direction in India?

In Central Provinces and Berar there are 819 factories out of which a dozen have got

canteens serving tea and snacks. One of them serves in addition balanced meals. The tea canteens supply snacks as *nimki*, sweets, *chura*, and also cold drinks. The snacks have got very little nutritional value and the quantities consumed are so small that they do not supply even the required calories not to speak of vitamins and minerals. The availability of milk and butter-milk is good although the amounts consumed are small.

The only canteen where cooked balanced meals are served is in the All-India Reporters at Nagpur. The attempt of the management is commendable. Though they have not been able to construct an up-to-date canteen building with all the paraphernalias of a modern canteen they serve the balanced meal to the workers in a modest way. A full meal consisting of rice, chapatti, dhal, vegetables, chutney, onion, tomato, chips and *lassi* can be had for about 4 annas. Dhal, vegetable and chutney are given free to every customer of a balanced full meal. The canteen staff besides their pay are given free meals in the canteen. The management is trying a scheme of extending the facilities of balanced cooked meals to the families of the workers which if successful will be a new achievement of industrial canteens not only in Central Provinces but in India. Thirty-five workers have so far enlisted for taking facilities of the canteen to be extended to their families.

In Central Provinces there are two types of canteen managements, one set of canteens is managed by the employers and the others by contractors. The quality of the foodstuffs is better and the price is comparatively lower in canteens managed by the employers as in Empress mills, All-India Reporters, Pulgaon Cotton mills, Reek Chand Gopaldash Mohota mills, The Savatram Ramprasad mills and Vidarbha mills, than in mills run by contractors as in Model mills, Rekehand Mohota spinning and weaving mills. The contractors of course are ordinary commercial firms and have to make profit.

Prospects of extending cooked balanced meal canteens in factories.—While discussing with the managements the feasibility of introducing cooked balanced meals in factory canteens in preference to tea and snacks, certain difficulties, though not unsurmountable, were realized for introducing such cooked meals. The problems and their suggested solutions may be stated as follows:—

(a) *Cost.*—A balanced meal will naturally cost more than the poor *bhakri* (chapatti) and chutney that the workers get from their homes for the mid-day meal during the noon recess. The workers are not prepared or cannot afford the extra money for a better meal. They expect

and want it at the same cost if not less than what they spend on their traditional *bhakra*. This question of cost can be solved if the employers subsidize the cost to the extent of at least half. The alternative solution would be to raise the wages of the workers to a 'living wage' standard according to local conditions provided that every worker shall take a balanced meal in the canteen.

It is doubtful if these measures will be voluntarily adopted either by the employers or the employees unless the government make those measures obligatory through legislation.

(b) *Education of the employees and employers.*—It has to be brought home to the workers that a balanced diet is a necessity for health and happiness and ultimately for increasing their earning capacity to their own benefit. The employers have yet to understand that spending money to feed the workers is no bad investment, it will ultimately pay in return of increased output and more profit. Most workers have no money left, after feeding and clothing themselves and their families, to improve the diet. Prohibition may cause some reduction in spending on luxury but the labouring man must have some mental and physical relaxation. If he can't drink he will gamble or try illicit drink. Planned recreation facilities are as essential as canteens or nearly so.

(c) *Co-operation.*—There is a sense of distrust prevailing between the employers and the employees. Any new action undertaken by the employer for the benefit of the employees is looked upon with suspicion and thought to be meant for the benefit of the employers only. Unless the workers give their full co-operation and take advantage of the factory canteens they will always be running at a loss. Almost all the canteens which are run by the employers in Central Provinces have been running at a loss. In fact two factories introduced balanced meals in their canteens and had to discontinue them for want of sufficient support from the workers.

To win the confidence of the workers they must be represented by at least 50 per cent in the managing body of the canteen. And the running of the canteen on a co-operative basis will go a long way to get the largest response from the workers.

(d) *Religious susceptibilities.*—No worker would object to drinking tea and snacks with fellow workers of other religions or castes but the ghost of caste prejudice at once haunts him as soon as he has to take cooked meals with them.

At the start arrangements will have to be made in conformity with the religious susceptibilities, but they may lapse after a time.

The fact that he spent his cash on frivolous amusement, etc., is due to his lack of appreciation of the need for better food for himself and his family and his ingrained conservatism and contentment with a very low standard of living.

The uneducated definitely need education on this matter.

Absenteeism is mainly due to (i) fatigue and (ii) unusual cash receipts, a man used to very low wages feels rich and does not feel the need to work regularly.

Unless and until better housing is provided for the industrial worker I feel it will be impossible to make him appreciate the value of a better standard. This has been the experience in Europe both during the industrial revolution in the middle of the nineteenth century and in more recent years following slum clearance activity. Give a man the possibility of a decent home life and he will quickly develop personal pride and joy in his house and family and will make effort to improve his position still further.

Till such time as the workers do not attain that mental state of voluntary co-operation they will have to be persuaded by some sort of compulsion to spend a reasonable proportion of their 'living wages' for a balanced meal in the factory canteen.

My grateful thanks to Colonel L. K. Ledger, O.B.E., I.M.S., for his kind permission to publish this article.

RICE GRUEL IN FOOD PREPARATIONS

SCHOOL-FEEDING EXPERIMENTS WITH KANJI (GRUEL) PUDDING AT BANGALORE

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DURING the cooking of rice in water a certain portion passes into solution and that is usually rejected because it interferes with the appearance, taste, flavour, keeping quality and digestibility of cooked rice. In some parts of the country, extra quantity of water is added and the liquid drained again to remove the last traces of the gruel. This practice is still being continued in spite of the increasing amount of knowledge regarding the attendant loss of vitamins, proteins, minerals and other essential food substances in the gruel.

*Rice Gruel is best separated and used with
other foods*

The general practice is not altogether faulty : in fact, it is now established that the rice with the gruel adhering to it becomes a pasty mass that is not easily penetrated by digestive juices. Rice is best digested when the cooked grains

remain separated and that would be possible only by removing the gruel. A practical approach to the problem would therefore be to separate the gruel from rice and use it as a food in some other form.

The gruel may contain 4 to 10 per cent solids, depending on the variety and condition of rice, degree of boiling, amount of water added and so forth. The gruel from previously washed raw rice is a fairly clean product containing 6 to 8 per cent starch: that from parboiled rice is usually thinner (containing 2 to 4 per cent starch) and somewhat strong in smell. The vitamin, protein and mineral contents are variable, depending on the extent of washing prior to cooking. If the washing is not extensive, the major part of the water soluble vitamins would pass into the gruel.

*The Gruel can be mixed with milk for
souring*

Rice gruel develops acidity on standing, lactic acid being the chief product. The fermentation proceeds quite smoothly on admixture with cow or buffalo milk. We have found that the gruel could be added to the extent of 25 to 30 per cent of the volume of milk and that the mixture develops acidity and sets to a thick curd as in the case of pure cow or buffalo milk. This would definitely be an advantage to homes which prepare their own curd and butter-milk and which could do with some extra supply. The acidity developed during the lactic fermentation helps to preserve the vitamins and this procedure would therefore be a simple and elegant method of using the gruel produced in most homes. The attendant chemical and biological changes have been studied and will form the subject of another communication.

Another and an equally elegant method would be to set the gruel to a solid and to use it as a sweet pudding. This type of preparation is quite popular besides being fairly cheap.

Preparation of Kanji (Gruel) pudding

At the invitation of the Bangalore Civil and Military Station authorities, we took up the standardization of conditions for this preparation and to produce it on a sufficiently big scale to provide mid-day meal for about 1,100 children per day. The procedure followed by us may be outlined as follows: The gruel (about 600 lb.) is obtained through the courtesy of the 6 M.T.T.C. and delivered each day between 12 noon and 2 p.m. It is not required till the next morning, so we bring it to a quick boil and store it in previously steamed vessels. On the day of use, it is again raised to boil and roasted, white wheat flour (35 lb.) in the form of a paste is added in rapid instalments with stirring. Sugar (35 lb.), salt (3 lb.) and edible colour (yellow, orange or any other pleasing shade) are added in quick succession. After about 15 minutes of cooking, a flavouring

material (cardamom powder or vanilla essence) is added and the pudding, which is already fairly thick, rapidly transferred to the storage vessels and allowed to set. It is then sent out to the schools for distribution to the children at half a pound per child.

It may be added that if previously boiled, the gruel keeps well for even 24 hours. Wheat flour roasted to a crisp brown (by heating in cast iron pans) cooks more easily, sets better and imparts a more agreeable flavour than the raw flour. Rice or corn starch can be used in place of wheat, but they are more expensive at the present time. Whole jowar or maize imparts a bitter taste besides feeling rather coarse on the tongue. With some processing, these millets can be used in place of wheat. Sugar is the most expensive item in the preparation, but we have found it difficult to reduce it to less than 7 per cent on the weight of the gruel. We have tried to replace sugar partly with saccharine, but the resulting preparation has not the same good taste or food value as that of the preparation with sugar. Gur (jaggery) affects the flavour: moreover, it is now more costly than white sugar. Cane juice can be used in place of white sugar, and where it is available, it will be advantageous to use it after neutralization and clarification. Increasing amounts of salt up to 0.5 per cent improve the taste. Edible colours are available and we have found that the yellow and orange impart pleasing shades. We were first using vanilla essence (made up with vanillin, coumarin, glycerine and alcohol) but found later that powdered cardamom (20 tolas to 500 lb. of gruel) imparts a more pleasing flavour.

The pudding thus prepared is best consumed within 8 to 10 hours after preparation. It can be kept longer in cold storage, but this facility may not be generally available. On prolonged standing the jelly breaks up, accompanied by development of acidity and other secondary changes which should be avoided.

*Incorporation of Soya paste improves taste
and flavour*

For some time we were incorporating 2 per cent skimmed milk powder but had to subsequently give it up because of the cost. More recently we have been incorporating the paste* obtained after pressing out soya milk at the rate of 125 lb. to 500 lb. of rice gruel. This addition improves the taste and flavour. Our total production now works out to about 675 lb. of pudding per day.

Cost of the preparation

The preparation of the pudding occupies only 3 to 4 working hours, so we employ the same

* The paste should be first added to the gruel and the wheat flour added right at the end. Otherwise, the preparation may not set properly.

staff for both this preparation and that of soya-bean milk and curd. After making due allowance for the proportionate expenses, materials used, depreciation on value of equipment, supervision, provision for unforeseen expenditure at 15 per cent and margin of 6 per cent as profit, the cost would work out to about one anna per pound. This would not include the cost of transporting the gruel (which is collected and delivered free by the kind courtesy of the army authorities) or distribution of the pudding to the different schools. Even after providing for these at one pice per pound, the cost is still attractive. The cost per child would work out to about $7\frac{1}{2}$ pices which is quite modest.

In the beginning we had to contend against a good deal of prejudice, but the product soon became steadily popular. Although we are using gruel from parboiled rice, the final product has nevertheless an attractive flavour and taste corresponding to that of more expensive preparations served in restaurants.

Possible improvements

The preparation is deficient in fat, the main source of this constituent being only the added soya paste (after extraction of milk) which contains 2.5 to 3 per cent oil. Extra fat in the form of deodorized oil, vanaspati or ghee would be rather expensive. About 1.5 pices per child would be about the minimum required to increase the fat content by about 1 per cent. Addition of a savoury would provide a good supplementary dish, but this, again, would add to the cost.

The children receiving the pudding are under the observation of the health authorities. Systematic records will soon be available. The pudding has also been fed to experimental animals and has been found to have a useful supplementary value when added to poor rice diet.

Gruel is still wasted. Other cities can produce similar preparations

The conditions of the preparation have now been standardized and the operations reduced to a routine. It should now be possible to start similar production at other centres as well. The gruel can be collected from any of the big feeding centres where rice is eaten. With proper organization, many big towns can produce substantial quantities of a clean, wholesome food material which can be fed either to the poor or to young school children who will eat it with much relish and benefit.

The above investigation would not have been possible but for the keen interest and enthusiasm of Mr. P. M. Jayarajan, Collector and Controller of Civil Supplies, Civil and Military Station, Bangalore, to whom our warm thanks are due. Our thanks are also due to Messrs. M. N. Srinivasa Iyengar and E. S. Krishna Iyer, who helped actively in the preparatory work and supervised the production.

UNDERGRADUATE TEACHING OF ANATOMY

By A. M. KHAN, M.S. (Anatomy), M.S. (Surgery),
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- A. Introduction.
- B. Criticism of existing standard and methods of teaching of Anatomy.
- C. Modern trends in teaching of Anatomy.
- D. Proposed standard of teaching Anatomy.
- E. Proposed methods of teaching Anatomy.
- F. Subsidiary recommendations.
- Summary and conclusions.
- References.

A. Introduction

SINCE publication of my (Khan, 1945) previous paper on 'The Organization of Anatomy Department' I have discussed this and allied topics with eminent anatomists in Britain, France, Switzerland, Canada and U.S.A. during my one-year tour in the West. Those who have completely endorsed the views expressed in this paper constitute a remarkable majority. The dissenting minority differed not on principles but in details. These principles have received unqualified recognition in the Bhore and Goodenough Committee Reports also.

The subject of the present paper, the standard and methods of teaching of anatomy to undergraduates, is a vital problem in medical education and has been dealt with extensively at special conferences and in the correspondence columns of the *British Medical Journal*, Society Addresses and Association Meetings since 1935. It was my privilege to discuss certain details in this connection with no less than twenty teachers in the West. What follows is a constructive analysis of all I could assimilate during this tour.

The trend of our conversation varied from country to country as the system of teaching anatomy and the time devoted to it differs in many respects in each country. To mention the time factor only, two academic years are spent in U.K. and Canada, and only one academic year in many schools in U.S.A. and U.S.S.R. Variation in time factor alone implies difference in the standard of knowledge of anatomy considered necessary for proceeding to clinical studies in different parts of the world. Such difference is attributable to the different methods of teaching as well as the influence of the tradition of the mother countries, France and England, over the system of medical education in the daughter countries. French school was the model for medical education in U.S.A. and English schools influenced the design of Canadian and Indian institutions. In Canada, the Toronto University gave in 1944 a lead in remodelling its system of medical education on American lines. At the Toronto school, teaching of anatomy is completed by the end of the first term of the second year. Dissection of head and neck is carried out in the second year

while other parts are dissected during the first year. Clinical teaching begins from the second term of the second year. It is desired to bring the standard of medical education, like the value of the Canadian dollar, at par with U.S.A. system in due course. Strong opposition prevails against this move in other parts of Canada on the plea of weakening the foundation of medical education and perpetuating the gap between it and the superstructure of clinical instruction. It must be pointed out that dissatisfaction prevails even in U.S.A. against the atlanticized continental methods. Some of the European schools are still the best.

On my return from America to England, I discussed the subject again with English teachers in the light of experience gained in the New World. Most fruitful discussions took place at the Royal College of Surgeons, London, with Professor F. Wood Jones, professor-elect and Professor Cave, the outgoing professor of anatomy at the college. Professor Jones (1942) maintains along with many others that teaching of anatomy must extend over two academic years. They are equally emphatic that access to clinical material must be arranged from the beginning of the second year to impart a living touch to the teaching of anatomy and to emphasize the importance and application of anatomical principles to clinical practice. The consensus of opinion is in favour of regarding the second year as the 'bridge' or the intermediate class between the hitherto water-tight compartments of preclinical and clinical courses—a very vicious division indeed as the following criticisms will bear out.

B. Criticism of existing standard and methods of teaching of Anatomy

This subject was discussed at some length in my previous paper. However, reference to the following important points will not be out of place:—

1. That two academic years are spent over the teaching of gross anatomy in cadaver houses by academic anatomists.

2. That the time spent in the teaching of cadaveric anatomy exceeds that spent on any other subject in the medical curriculum.

3. That knowledge of details of topographic anatomy thus learnt serves no useful purpose in the clinical training or future career of the vast majority of undergraduates who will go out in general practice.

4. That such details are consequently forgotten at the earliest opportunity without serving the purpose of even those who wish to proceed to postgraduate study.

5. That no undergraduate standard is maintained in the teaching of anatomy, unlike the practice in vogue in respect of other subjects of the medical curriculum. A graded standard for under and postgraduate courses is also the

accepted principle in the study of other Science and Arts subjects.

6. That no attempt is made during the preclinical period to teach the application and importance of anatomical knowledge to clinical work, thus defeating the very object of learning anatomy.

7. That the gulf between the preclinical and clinical studies, therefore, remains too wide and accounts for the ignorance of the undergraduate in respect of clinical anatomy.

8. That teaching of clinical anatomy is not carried out in the senior classes by teachers of anatomy, who are best suited to do so, with a view to emphasizing the application of anatomical principles to the diagnosis and treatment of individual cases. The following quotations from representative opinion will substantiate the abovementioned comments: 'We are of the opinion that the usual curriculum for anatomy which is followed at present is partly determined by traditional ideas which are no longer valid, and that it requires revision in certain directions. Much of the anatomy which the medical student is commonly required to learn is concerned with topographical details of importance only to the specialist and we believe such details are quite unnecessary for the ordinary medical student who is working for the preclinical examination' (Appleton, Boyd, Clark, Hamilton and Whillis, 1942).

Referring to the above letter, an eminent correspondent remarks:—'*The defect is shown by the profound ignorance of the majority of students beginning their clinical work concerning the aspects of anatomy which are of importance to the study of disease. In clinical teaching an anatomical question rarely elicits the proper answer*'.

'What is the nature of the defect in the teaching of anatomy which such a lack of knowledge suggests? Is it possibly a fault of the present system whereby medical students spend two years under teachers not in clinical practice, in departments of anatomy often widely separated in space, in administration and perhaps in spirit from the clinics to which students will proceed? I think it undoubtedly true that under this system teaching will tend to lack clinical perspective and will lead the students implicitly to regard anatomy as a subject unrelated to the study of disease, to be put aside with a sigh of relief on proceeding to clinical work'.

'Should this be so, a possible, if rather drastic remedy would be to eliminate the separate department of anatomy and the academic anatomist from the curriculum, and to present the anatomy "required by the general practitioner" during clinical instruction' (Jessop, 1942).

'No doubt that the structure of the body is the necessary foundation of our subject, but while we can name off-hand many admirable doctors can we guarantee one who could map out the anastomosis round the knee-joint, or its

capsular and muscular attachments? No: a good doctor does not need such details or to know the cranial foramina and what each transmits. To no advantage are the student's youthful years busied with such structural details' (Adams, 1942).

'It is laid down in the existing regulation that elementary methods of clinical examination including the interpretation of physical signs, the use of the stethoscope and ophthalmoscope, and introduction to general Pathology and Bacteriology should be taught in the preclinical period. It has hitherto not been possible in most universities to arrange for this teaching up to the required standard' (Health Survey and Development Committee Report, Vol. III, p. 111).

C. Modern trends in teaching of Anatomy

1. That in view of the future requirements of the undergraduates principles of anatomy should be taught instead of minute details.

2. That cadaveric anatomy should be regarded as the means and living anatomy as the end of teaching the subject.

3. That living anatomy should comprise of:—

(a) Surface Anatomy including minor endoscopy.

(b) Radiological Anatomy including fluoroscopy and demonstrations on plain and contrast radiograms.

(c) Clinical Anatomy including introduction to clinical methods.

4. That principles of embryology with reference to congenital defects should be taught instead of details of embryology.

5. That, in addition, principles of post-natal growth should also be taught in relation to nutritional and hormonal disturbances. Emphasizing the necessity of including post-natal growth in the curriculum, an eminent anatomist remarks: 'It has always been an anomaly that the student should be given opportunities of acquiring a good knowledge of antenatal development and of the anatomy of the adult, but little or no attempt should be made to bridge the gap between' (Johnston, 1942). Following quotations from representative opinion will bear out the general trend:—

'Dissection of every part is unnecessary; sound knowledge can be obtained by other methods in association with a limited course of dissection' (British Medical Association Committee on Medical Education).

'G. P. needs to know in general way and not details which anatomists and surgeons should know' (Adams, loc. cit.).

'At one time hospital attendance and dissection ran concurrently; departure from this has been a disadvantage. Bearing this in mind I have arranged patients to be presented to senior students. Much closer co-operation between anatomical and clinical study is needed; anatomists might be attached to the staff of hospitals in order to make this possible' (Dow, 1942).

'In most universities principles and practice are placed on opposite poles so that when the student reached his practice he had forgotten his principles.'

'Whole body should be dissected but less details expected from the students.'

'During the later years of the curriculum, special courses in anatomy should be arranged in association with final years subjects' (Dow, 1942, and Indian Medical Council).

'In teaching and in learning what we want is more of the *why* and *wherefore* type of anatomy and this should begin right from the start in the early days of undergraduate training and not be left as an addendum to be taken up in the later years of the curriculum.'

'Learn anatomy and then apply it' is the attitude of many. We would say 'Apply anatomy while you learn it, because until you can apply it you really haven't learned it' (Kirk, Middlesex Hospital, London. Paper read before Association of Surgeons of Great Britain and Ireland, 2nd May, 1945).

'Every effort will be made to exemplify this principle by the inclusion of clinical teaching in the preclinical period, given by a clinician who will bring living reality into what often tends to be a dead and purposeless study. Similarly the teaching of preclinical subjects will not end with the passing of examinations but will extend into and throughout the clinical years by regular courses given not informally by clinicians, but by regular teachers in the preclinical subjects' (Bhore Committee Report, Vol. II, pp. 356-7).

'During the last two terms of the intermediate period the gap between the intermediate and clinical studies should be bridged by examples of the applications of physiology and anatomy to clinical medicine and surgery and by an introductory course illustrating the principles of general pathology, immunology and bacteriology. With this object it is desirable that a member of the staff of the Department of Anatomy, Physiology and Pathology should be afforded free access to the clinical material of the hospital—or, alternatively, that a member of the staff of the hospital should be attached to each of the departments. This proposal is made not with a view to initiating the student into the problems of clinical medicine but to enable him by the demonstration of the application of physiology, anatomy and general pathology to the study of medicine to appreciate the relevancy of his laboratory observations and experiments to the structure and function of the living human body' (Report of the Conference of Representatives of Oxford, Cambridge and London Universities and Royal Colleges on the Medical Curriculum, London, 30th April, 1935).

D. Proposed standard of teaching Anatomy

Perusal of the criticism of existing standards and methods as well as the modern trends in

different countries should leave no doubt in the mind of any one that there is an urgent need to set our house in order. To implement such reforms as are envisaged by individuals and committees already referred to a few suggestions are offered in the following paragraphs :

At least 90 per cent of the undergraduates qualify to engage in general practice. While no detail is too unimportant for the specialist it will suffice for the would-be general practitioner to be conversant with 'basic anatomy of the living'. Basic anatomy of the living implies knowledge of the development and structure of the body which will enable the undergraduate to understand the significance of congenital abnormalities, defects of post-natal growth, clinical signs and symptoms and help him in the prevention and treatment of diseases as a general practitioner. To be more explicit, basic anatomy should comprise of general principles of (a) embryology, (b) post-natal growth and (c) living anatomy of the adult. It appears necessary to illustrate the conception of 'principles' instead of 'descriptive details' with which the existing textbooks are stuffed.

Principles of embryology.—This should comprise a course of lecture demonstrations, illustrated by actual embryos, models and diagrams, emphasizing the process of differentiation in the embryonic disc which results in the formation of the rudiments of the nervous, alimentary, respiratory, circulatory, genito-urinary and skeletal systems. This should be followed by an outline of the development of each system, indicating the genesis of common congenital defects associated with each system, viz, spina bifida, tracheo-oesophageal fistulae, imperforate anus, undescended testis, polycystic kidney, hare-lip, cleft palate, etc.

Principles of post-natal growth.—This should comprise a study of the following aspects :—

1. General features of growth in relation to (a) cell division, (b) fuel supply, (c) environment and (d) heredity.

2. Classification of growth patterns :—

(a) *General type.*—Growth of the body as a whole, linear (stature), areal (surface area), ponderal (volume). Standards of height-weight ratio at different ages as required for the assessment of physical status.

(b) *Neural type* (brain, eyeball, etc.).—Rapid growth during infancy and childhood with a sharp transition to a slow rate up to maturity.

(c) *Lymphoid type.*—Rapid rise in infancy and early childhood, a continued increase to a peak about puberty and decline thereafter.

(d) *Genital type* (prostate, testis, uterus, ovary).—Slight increase in infancy; latent period lasting to the later part of the first decade; rapid growth throughout prepubertal period and adolescence.

(e) *Supra-renal type.*

(f) *Mixed type.*

3. Rhythm and rate of growth at various ages, its relation to sexual hereditary, hormonal, nutritional, environmental factors and disease.

4. Growth changes in the soft parts, viz, spinal cord, kidneys, urinary bladder, heart, lungs, etc.

5. Growth changes in the skeleton :—

(a) Progress of ossification and maturation with special reference to long bones, paranasal sinuses, mastoid process, arches of the foot, etc.

(b) Cessation and arrest of growth; outlines of determination of skeletal age and comparison with chronological age.

6. Correlation between physical growth and mental growth as assessed by I. Q. tests.

7. Retardation of growth, senescence and senility. Factors concerned in and biological significance of these phases of growth.

Principles of living anatomy of the adult :—

Skeletal system.—Detailed study of each bone has nothing to commend it. This remark applies with greater force to small bones of the hand, feet and the trunk than to the skull, long bones and the pelvis. Going back to the small bones, it is a favourite question in the oral examination to ask the side of a carpal or serial number of a rib which differs only slightly from the typical member of the series. To answer such questions a detailed study of these bones is required. What useful purpose can be served by mastering such details during clinical career or general practice I am at a loss to understand.

Comparative study of carpus *versus* tarsus and metacarpus *versus* metatarsus, training to recognize the bony landmarks presented by them in the living body and identify them in skiagrams is recommended. Attention should be drawn to sesamoid bones and accessory ossicles in skiagrams. Study of a typical rib and the grossly atypical ones should be combined with training to recognize them in the living and skiagrams.

Skull.—Bearing the utility consideration in mind, detailed knowledge of the individual cranial bones, except the temporal, is hardly necessary. Conception of the skull as a whole, relation of vertex to underlying brain and meningeal artery, and of the base to the exit of cranial nerves is much more important. Among the facial bones, mandible and maxilla deserve special consideration. Orbit, nasal cavity, paranasal sinuses, middle ear and its relation to mastoid process demand a detailed study.

Vertebral column.—Familiarity with a typical vertebra of each series as well as the grossly atypical ones, and with the nature of intervertebral joints, foramina, curvatures of the spine and how they are maintained is recommended. Sacrum deserves special consideration in relation to the pelvis and the anatomical variations at the lumbosacral junction.

Long bones.—Intimate knowledge of the long bones in terms of structure and function is

desirable. It is important to know the contour of their shafts and build of their articular ends. Growth changes, epiphyseal line, capsular reflection, angles, subcutaneous borders and curvatures of shaft merit special consideration. It is not enough to learn the dry bones. What is more important is training during the preclinical period to identify their salient features in the living, clinically and radiologically. The last recommendation should apply to the entire skeleton.

Neuro-anatomy.—It is important to know the functional anatomy instead of details of structure of the central nervous system.

Spinal cord.—The pattern of the structure of the spinal cord is essentially the same throughout. Grey matter is disposed in a continuous sheet around the central canal. It has somatic and autonomic components. The white matter surrounds the periphery and comprises of ascending and descending tracts. Only the important tracts need be taught.

Medulla, pons and midbrain.—Their structure admits of a common plan so far as disposition of grey matter in form of nuclei dorsally and white matter in form of tracts ventrally is concerned.

Cerebrum and cerebellum.—The neopallial grey matter is disposed on the surface while the phylogenetically older centres are represented in the buried nuclei. Shape, position, relation and function of such nuclei deserves attention. The ventricular system, subarachnoid space and the circulation of C.S. fluid deserve emphasis. The localization of 'functional areas' on the cerebral cortex and structure of the internal capsule must be learnt.

Peripheral nerves.—A knowledge of their origin, course, muscular distribution and sensory territory is important. While the sensory territory of a nerve trunk is of importance, it is futile to know every cutaneous twig arising from a nerve. As regards relations of nerves, details are unnecessary; emphasis should however be laid on the specially vulnerable sites in their course, viz, relation of radial and ulnar nerves to the humerus, lateral popliteal nerve to the neck of the fibula, etc. Importance of such knowledge should be emphasized at the bedside during the second year and throughout clinical training.

Cardiovascular system.—Teaching should aim initially at presenting the anatomical basis of circulation during foetal and post-natal period. Structure of the heart, its nerve, and blood supply, its position and relation to the body surface in the living, its apex beat and sound will receive the first consideration. Among the arteries, course of large vessels concerned in the systemic and pulmonary circulation will rank next. The undergraduate should be trained to delineate the course of superficial vessels in the living with the help of their pulsation and identify intra-thoracic vessels in skiagrams.

Among the smaller ones, lenticulo-striate, post-inferior cerebellar, middle meningeal arteries, etc., merit special attention.

Course of minute branches participating in arterial anastomosis is unnecessary. On the other hand principles of collateral circulation, effects of interference with circulation, and response of a limb, thus affected to temperature changes should be stressed. This can be done at the bedside or on experimental animals. It must be emphasized that it is more important for the undergraduate to know the application of that minutæ of structure, just as it is more important for him to know the action of sulphonamides than the mode of their action. 'Anatomy without physiology is dead; physiology without anatomy can have no meaning and pathology without anatomy and physiology would be a mystery' (Kirk, *loc. cit.*).

Veins.—Origin and course of important venous channels of the systemic and portal circulation should be taught. Anastomosis between systemic and portal circulation and the importance of such anastomosis must be emphasized in the living. Dural sinuses, their rôle in the absorption of C.S. fluid, their surface relations at different ages, their important tributaries including emissary veins and the importance of the latter should be stressed. Saphenous and cubital systems deserve special consideration. Mechanism of venous return, the effects of interference with such return and varicosity of veins must be brought home in the living. It is equally important to know the plan of vascular supply to muscle, tendon, joint capsules, synovia, nerve, skin and important viscera. Details of visceral blood supply which assume great importance to a surgeon are considered unnecessary for the undergraduate.

Lymphatics.—Instruction on parietal lymphatics with their regional nodes in the axilla or groin, and visceral lymphatics with their regional nodes in the abdomen, thorax and the neck as well as the circle of Waldyer should be given in a general way during the preclinical period. Study of the lymphatic drainage of individual organs should be stressed during the clinical years by teachers of anatomy.

E. Proposed methods of teaching Anatomy

Having considered the undergraduate standard in anatomy the next problem demanding attention is the method by which the undergraduate should be equipped with the requisite knowledge in the least time. In dealing with this aspect of the theme certain considerations based on modern trends must be borne in mind.

1. That since the undergraduate has to deal with the living throughout his life he should be taught, as far as possible, 'living anatomy' already defined.

2. That teaching of the principles of anatomy, which cannot be carried out on the living, must

be carried out on the cadaver; knowledge thus gained will be referred to hereafter as 'cadaveric anatomy'.

3. That 'living anatomy' is the end of teaching anatomy and 'cadaveric anatomy' is the means to that end.

4. That the undergraduate must be taught the importance and application of anatomical principles to diagnosis and treatment as early as possible. Such teaching must be carried out by teachers of anatomy throughout the clinical years.

In view of these fundamental considerations teaching has to be so organized as to equip the undergraduate with knowledge of 'principles of anatomy' which are of importance in the diagnosis and treatment of ailments that fall to his lot. In view of the vast majority going out in general practice, the requirement of anatomical knowledge for the class of general practitioners must receive priority in organizing teaching of anatomy. Such an organization must provide for graded teaching during the preclinical and clinical years and also bridge the most abrupt gap between preclinical and clinical periods. A happy compromise between current Indian methods, and those followed in U.N.R.A. and U.S.A., can be achieved by teaching the traditional 'Cadaveric Anatomy' as the basis during the first year and 'Living Anatomy' during the second as well as subsequent years of the medical curriculum. The whole of the second year can thus be utilized as a link between cadaveric and clinical teaching.

Cadaveric Anatomy in the first year

As explained already this refers to anatomy learnt from the study of bones, dissected parts and actual dissection performed by the undergraduate himself. While dissection provides unique opportunities to study the structure of the human body in detail there are certain inherent defects in it from the viewpoint of the undergraduate :—

1. The existing system consumes over 1,000 hours of the preclinical period on anatomy and appears to be the greatest defect in the education of the undergraduate in India. Some of this time could certainly be spent better on pathology and preventive medicine.

2. The viscera of formalin—hardened cadavers give a distorted picture of the living structure.

3. The undergraduate does not require the details thus learnt for successful practice of his profession as a general practitioner. Keeping in view the abovementioned objections to the two-year course of cadaveric anatomy, taught by academic anatomists, it is highly desirable to modify the method as to permit completion of such course within the first year, thus sparing the second year for commencing the study of 'Living Anatomy'. The following method, as practised in this university, is suggested :—

Demonstration on a bone should go side by side with the study of related soft-parts previously dissected. This is to be followed by demonstration—dissection by a teacher on the same region whenever parts are available with a view to setting the undergraduate's bearing for independent dissection. Finally, the student dissects the very part the bone and soft tissue of which he has already studied.

The method holds good for the extremities, head and neck and to a limited degree for the brain and the abdomen. No time is wasted in dissecting out cutaneous nerves or veins as the latter are best studied in the living. Special features of deep fascia are studied in the course of dissection. The plan on which deep dissection is carried out is based on the methods followed in U.S.A.

The undermentioned schedule is followed by the first-year students in this university for dissection and lecture demonstrations on the lines indicated above. Division into batches dissecting different parts is unavoidable due to paucity of cadavers :—

August to November	Superior extremity, thorax, inferior extremity, brain (by rotation).
December	.. Revision and class test.
January to March	.. Abdomen and head and neck.
April	.. Revision and class test.

Students attend lecture demonstration for one hour and dissect for three hours on every working day. There are 184 working days in each session. Thus, theoretically 736 hours are required to complete the study of cadaveric anatomy. Making allowance for Saturdays, casual holidays and change-overs, this time does not exceed 600 hours of solid work in the department of anatomy. Since the entire body is dissected at full speed, considerable time is required to assimilate the text. Taking into consideration the time taken up by physiology, teaching of other aspects of anatomy during the first year is not considered desirable. However, a course on general embryology is given in this university in the form of lecture demonstrations for two hours out of the six hours didactic teaching per week during the early part of the session.

Living Anatomy in the second year

'To recognize the absence of the pathological is often just as valuable as to detect its presence.' (Kirk, *loc. cit.*)

That the undergraduate must learn 'Living Anatomy' to facilitate his clinical training and practice in future has received universal acceptance. What constitutes living anatomy and how it should be taught still remains vague to many. I utilized every opportunity to discuss these points with members of the craft abroad and had many surprises while talking to a number of seasoned anatomists. Professor Wassermann of the Chicago University, a German refugee in U.S.A., held very clear views on 'living anatomy';

but preferred to use the term 'functional anatomy' instead, as he laid emphasis on the teaching of the function of each structure. Some thought that 'living anatomy' implied only surface anatomy; others took it to be synonymous with 'radiological anatomy'. A good many were in favour of using this term for anatomy learnt from clinical cases, viz, hare-lip, cleft palate, hernia, nerve palsies, etc. A careful analysis leads me to the conclusion that living anatomy should comprise of the following:—

1. Surface anatomy including identification of subcutaneous structures, relation of viscera to body surface, endoscopic appearance of easily accessible cavities—nasal, oral, aural, etc.

2. Radiological anatomy.—Anatomy learnt by fluoroscopy, plane and contrast radiography of normal structure.

3. Clinical anatomy.—Anatomy learnt from clinical cases by using clinical methods instead of the scalpel and dissecting forceps.

The teaching of clinical anatomy in the second year of the preclinical period is a recent innovation and its importance has been emphasized under different names on many occasions by individuals and expert committees—Goodenough Committee in England, Indian Medical Council and Bhore Committee in India, several medical faculties in U.S.A., etc. Unfortunately detailed reasons have not been given in support of this move. Nor have these reports received enough publicity. These facts coupled with the apprehension of clash against vested interests and the conservatism of people trained in cadaver houses have stood in the way of urgently called-for reforms in undergraduate teaching in anatomy. An attempt is made in the following paragraphs to substantiate the necessity of access to clinical material in the teaching of this subject on modern lines.

Necessity of teaching Clinical Anatomy in the second year

There is no objection to the teaching of living anatomy on the normal in any quarter but encroachment by the abnormal is seriously objected to by a few clinicians and academic anatomists. Whatever their reasons against teaching living anatomy on the abnormal or so-called 'clinical anatomy' be, my arguments for insisting on doing so are based on the following desiderata:—

1. To bridge the gap between cadaveric study and clinical requirement.

2. To emphasize the importance and application of anatomy to clinical study and practice.

3. To emphasize the normal by contrast and comparison with the abnormal.

4. To teach those aspects of anatomy which cannot be taught on the normal, viz, lymphatic system, muscle functions, congenital defects, etc.

5. To bring teaching of anatomy in alignment with the requirements of clinical training and practice.

6. To impart a 'living and practical touch' to the teaching of anatomy.

7. To give the undergraduate a chance to distinguish between 'applied anatomy' and 'gross anatomy' at the proper time.

8. To develop in the undergraduate the power of observation to differentiate between the normal and abnormal at the earliest opportunity.

9. To turn out at the end of the First M.B.B.S. course 'embryonic clinicians' instead of 'cadaveric anatomists'.

10. To save two months' time of the undergraduate hitherto spent in certain universities over so-called 'preclinical classes' taken just an hour a day by most junior residents to baptize those freshly promoted from the cadaver house to the hospital for more serious clinical work. I fear such classes were devised to comply in letter with a recommendation of the Indian Medical Council for including an introduction to clinical methods during the second year of the curriculum with a view to facilitating teaching and learning of living anatomy. Most of the abovementioned reasons are too obvious to merit an explanatory note. However, a few general remarks will not be out of place to clarify the issue.

Bridging the gap.—The official method of teaching anatomy in many Indian universities aims at producing a cadaveric anatomist in two academic years in the pious hope of his resuscitation to life in the teaching hospital. This practice is based on bitterly criticized British traditions which owe their existence to the late addition of preclinical departments to fully-grown voluntary hospitals not under university administration. An overnight jump from the glass chamber of the cadaver house to the hospital incubator is a big performance indeed and successfully evades any possibility of emphasizing the relation of anatomy to disease by teachers of anatomy who are best suited to do so. What a sad commentary indeed!

The extent of the existing gulf between conveniently called preclinical and clinical studies can be easily gauged by taking into consideration what the undergraduate learns during the pre-clinical years and what he is required to know to facilitate his clinical training. Briefly, the undergraduate is taught during his preclinical years all details of cadaveric structure of the following:—

- (a) *Heart*—except training to localize the apex beat and detect its normal sounds.

- (b) *Lungs*—except the nature of respiratory sounds.

- (c) *Liver, spleen and kidneys*—except training to locate them in the living.

- (d) *Spermatic cord*—except its feel in the normal living.

- (e) *Arteries*—except that they pulsate and such pulsation is helpful in locating them and testing their patency in the living.

(f) *Neuro-anatomy*—except that it is related to signs and symptoms, *viz*, pain or anæsthesia, motor or vasomotor paralysis, visceromotor and viscerosensory reflexes, etc.

Knowledge of the 'exceptions' is undoubtedly the ultimate goal of learning anatomy. If so, is there any reason why the existing gap between the 'starting point' and the 'goal' should not be bridged? It is equally certain that the second year of the curriculum is the ideal period for bridging this ghastly gap.

Importance and application of anatomy.—The undergraduate in medicine has to learn anatomy with a definite aim, unlike the undergraduates in some other faculties, who learn their subjects just to obtain a passport for a career in which knowledge of the subjects studied may not be required. The aim of the medical undergraduate in learning anatomy is to develop a life-long familiarity with the application of anatomical principles to diagnosis and treatment. The present system of teaching cadaveric anatomy without any reference to the importance and application of the 'bundle of facts' taught, therefore, amounts to an utter disregard of the undergraduate's aim. It has been argued that their attention is drawn to the applied aspects of anatomy later—in the two months' preclinical course and regular clinical work.

Admitting that 'clinicians do so in senior classes, the objection that anatomists do not get a change of doing so at the most opportune period in junior classes stands very boldly. There can be no doubt that this responsibility devolves primarily on the anatomists who are expected to prune undergraduate teaching in a way refitting the future requirements of their pupils instead of burdening them with gross details of cadaveric anatomy. Can the anatomists do any better in their cadaver houses in spite of best intentions to do so? The answer is too obviously in the negative.

To justify the two years' course of cadaveric anatomy it has also been argued that undergraduates cannot follow application of anatomical principles without knowledge of pathology. The reply is simple: anatomical principles are being confused with pathological principles. It must be realized that before a proportionate blending of anatomical, physiological and pathological principles occurs in the subconscious mind of the undergraduate to evolve consciously a diagnosis or line of treatment, he must be taught separately the application of the principles of the three sciences named above at the bedside. Teaching of gross details to undergraduates in a cadaver house at the expense of the application of anatomical principles at the bedside defeats the very object of such teaching. Hence there is no justification for a two years' course of cadaveric anatomy in the undergraduate curriculum which lacks at present any provision for correlating anatomy with clinical work.

Emphasis on the normal by comparison and contrast against the abnormal

Teaching of gross details of cadaveric anatomy for two years is justified on the plea of imbuing the undergraduate with knowledge of normal structure. His ability is tested by questions on topographic details which shall seldom be of any help in his future career. *Is any attempt ever made to test his knowledge of the normal in the living?* No: The only way it can be done is to present to him abnormal cases and ask him to pick up the normal side in case of bilateral structures, *viz*, limb bones, testis, vas deferens, subcutaneous inguinal ring, etc. In case of unilateral and symmetrical structures, the same purpose can be achieved by comparison between a normal individual and a patient or between normal and abnormal films. In clinical work the decision between normal and abnormal has to be made invariably in the living. Knowing that such a decision becomes sometimes difficult even at a post-mortem examination, it must be realized that it is many times more difficult to make this distinction in the living. This is all the more reason that the student of anatomy must be made familiar with the appearance, feel, position, size, sound and radiological appearance of normal organs in the living. Such a training can be initiated on the normal but how can the conception of the normal be verified unless the abnormal is also available for comparison. To facilitate such comparative study access to abnormal material is indispensable. While the clinician needs clinical material to demonstrate the process of diagnosis, the anatomist needs it for emphasizing the normal by contrast and comparison.

Study of the normal by reference to the abnormal.—The following aspects of anatomy cannot be taught satisfactorily either on the cadaver or normal living subject:—

(a) Lymphatic system.

(b) Muscle function.

(c) Neuro-anatomy.

(d) Congenital defects and abnormalities of growth.

(a) *Lymphatic system.*—Importance of the study of the lymphatic system can hardly be over-emphasizing. Since it cannot be studied in the normal, clinical demonstration becomes inevitable. This is the only way it can be impressed on the undergraduate that the groups of nodes described in their books do exist in the body. Such a study will have to be a living study and a single demonstration of such a nature is worth more than many didactic lectures. Cases will also demonstrate the importance of such knowledge.

(b) *Muscle function.*—Muscle action cannot be learnt in the cadaver. Cramming of muscle action, as given in textbooks of anatomy, is a colossal waste of time since never one muscle acts singly in the living. It is not so much the action of individual muscles as the function of

group of muscles that is of real importance. In the normal subject when the primary movers come into play, other group of muscles, synergists and antagonists play their part as well, and it is wellnigh impossible to judge the function of individual or group of muscles. Further, any attempt to demonstrate such function on the normal does not create any impression on the undergraduate regarding the importance and application of the knowledge of muscle function. However, the only way that the undergraduate can be impressed with 'practical knowledge' is by demonstration on (a) normal individual subjected to electrical stimulation of their nerve trunks and (b) cases with nerve or muscle lesion. He can be made to test muscle function and tone for himself in the course of such demonstrations and the teacher can emphasize the anatomical basis of disturbed function and tone as well as the importance of such knowledge in re-educating muscle control by remedial exercises.

(c) *Neuro-anatomy*.—It is the functional anatomy of the central nervous system that the undergraduate is expected to learn. He does the spade-work by dissecting certain areas of the cerebral cortex, internal capsule, nuclei of the brain stem, etc. Such dissection gives no idea of their importance or their function. No amount of lecturing will leave a more lasting impression than demonstration on neurological cases. If cadaveric anatomy can be made so lively and interesting by such demonstrations, why should the undergraduate be condemned to cadaver houses while learning anatomy? 'The demonstration of a hemiplegic patient will teach a student many facts about the physiology and anatomy of the pyramidal tract which cannot be learned in any other way' (Report of the Conference of Representatives of Universities and Royal Colleges).

(d) *Congenital defects*.—While teaching principles of an embryology the teacher has to refer to hare-lip, cleft palate, branchial cyst, spina bifida, club feet, etc., to emphasize the importance and application of embryology. What impression will these terms convey to the undergraduate who has never seen such cases? He cannot appreciate at all what they signify. Models, diagrams and photographs improve the position but can they replace actual cases? To make the study of the subject interesting and practical recourse to clinical material becomes inevitable. Development of a clinical perspective and proper outlook in the undergraduate towards application of embryology is much more important than knowledge of 'blank' gross details.

Post-natal growth.—Knowledge of principles of post-natal growth is as important as those of embryology. Normal growth is considered such a natural phenomenon that it is hardly considered of any consequence by many; this is the main reason why post-natal growth has not been paid

the attention it deserves. The only way it can be emphasized is by demonstration on abnormalities of growth—stunted or accelerated growth, lapsed union, osteochondritis, achondroplasia, metaphysial aclasis, genu varus or valgus, postural scoliosis, faulty dentition, etc.

Bringing anatomical teaching in alignment with clinical needs

Knowledge of anatomy is required for the following purposes:—

1. To interpret signs and symptoms.
2. To perform clinical examination and detect an abnormality.
3. To evolve a diagnosis with the help of other investigations.
4. To institute proper line of treatment.

If the scope of anatomy is so wide why should its teaching be confined to cadaver houses? Obviously it must spread throughout the medical curriculum to give the undergraduate maximum benefit of the department of anatomy. Having acquired the knowledge of cadaveric anatomy in the first year the time of the undergraduate in the second and later years can be best occupied with diversion of his knowledge along the channels in which he will find a practical application of such knowledge. The subject is dealt with item by item.

Signs and symptoms.—To interpret signs and symptoms correctly it is essential to know their anatomical basis. Among such symptoms and signs may be mentioned, visceral and articular pain, local or referred, hyperæsthesia, protective rigidity and spasm of muscles, including limitation of excursion of diaphragm, wasting of muscles, alteration of reflexes, etc. It is equally important to know the anatomical basis of Trendelenburg, Moynihan's, Rovsing's signs, etc.

Clinical examination.—Knowledge of the body as a whole is a necessary preliminary to such investigation. Teaching on body types, variation in the position and shape of viscera associated with each type and training to recognize them must receive the attention they deserve. The practice of cramming details regarding surface marking of normal viscera leaves much to be desired. The standard landmarks based on averages and recommended by textbooks for this purpose most certainly do not apply to every normal individual. This can be best illustrated by referring to the heart; some hearts are placed transversely while others occupy a vertical position; how can the standard methods of marking the heart be compromised with its variable position? Moreover, the stereotyped methods of learning anatomy fail to provide the clinical perspective which is much more important than details of gross anatomy. Hence 'living anatomy' must be learnt on normal and abnormal subjects by resorting to clinical methods.

If routine teaching is modified on the above lines it is bound to change the outlook of the undergraduate and is calculated to prepare a

solid foundation for a scientific instead of an empirical clinician—the latter only knows that pain and vomiting are symptoms of appendicitis while the former is conversant with the anatomical basis for different signs and symptoms of the disease.

Diagnosis and treatment.—The importance and application of anatomical principles to the diagnosis and treatment of individual cases should be emphasized during clinical years by teachers of anatomy who must have free access to clinical material for the purpose.

Proposed schedule of teaching for the second year

Principles of anatomy	..	2 hours per week
Regional embryology (in batches)	..	1 hour per week
Post-natal growth (in batches)	{	1 hour per week (alternately).
Radiological anatomy (in batches)		
Surface and clinical anatomy (in batches).	..	2 hours per week
Prosector's duty	..	6 hours per week
TOTAL	..	12 hours per week

The above scheme is based on two hours' work per day in the second year as against four hours' work in anatomy during the first year. The two hours' time thus spared per day during the second year can be utilized for the teaching of additional subjects as recommended by the Indian Medical Council, viz, Principles of General Pathology, Elementary Bacteriology and Preventive Medicine.

F. Subsidiary recommendations

To introduce reforms in the teaching of anatomy on the proposed lines the following measures must be taken:—

1. Revision of the terms of appointment of the staff.
2. Preparation of textbooks on basic anatomy.
3. Installation of a diagnostic x-ray plant in the department of anatomy (Lucknow University has already done so).
4. Reorganization of the system of examination.
5. Teaching of clinical anatomy in senior classes by teachers of anatomy.

Terms of appointment of the staff.—The existing defects in the teaching of anatomy are undoubtedly an outcome of one of the conditions on which senior staff of this department is appointed—complete divorce from clinical work in spite of their being capable of doing such work. This condition may be an advantage to those teachers who desire to become academic anatomists for reasons of health or aptitude; but the poor students have to pay a very heavy premium on their education under such teachers. In the light of modern trends in teaching there is no place for such anatomists on the staff of institutions where undergraduates are trained.

There is yet another way in which the existing terms of appointment affect the cause of medical education adversely. This is by causing dissatisfaction among highly qualified teachers of

anatomy who quit the department at the earliest opportunity to take up more paying appointments on the clinical side. So far as Lucknow University is concerned, 11 out of 12 permanent teachers of this department can be called 'deserters'. The same holds true for several other universities. For these reasons there is dearth of suitably qualified teachers of anatomy in this country.

I am at a loss to understand the rationale underlying the existing term of appointment. Perhaps the idea is to spare the senior teachers of anatomy for wholtime research. As pointed out in my previous paper it is not possible for all academic anatomists, confined perforce to cadaver houses, to do any useful research unless they come in contact with human problems. The problem differs with the worker's experience and qualification. Why should his opportunities for work not differ? Under the present conditions there is every justification for suggesting a complete overhaul. However, a happy compromise between the two extremes will be to recruit 50 per cent of permanent staff on the condition of doing part-time clinical work. This principle has been in force in certain Indian universities, for years in respect of the departments of pharmacology and pathology. I know of other institutions in India and abroad where anatomy and physiology teachers are similarly governed. There is a strong case for universal adoption of this principle.

I have carefully studied the recommendations of the Bhore Committee on the subject and find it difficult to agree with them *in toto*. In fact their very approach to the problem is not above criticism. By recommending a senior liaison officer between clinical and preclinical studies as an additional hand they have failed to realize that the new hand, however brilliant, cannot change the 'cadaveric tone' of the entire department. Moreover, it will not be possible for one man to do the amount of work that teaching of the application of anatomy to different branches of medicine entails. Surgical, medical, ophthalmic and gynaecological anatomy cannot be taught by one person. Assuming that ophthalmic and gynaecological teaching will not require separate teachers (as much of it can be taught with medical and surgical anatomy) I consider it very important to have two separate persons. All this will involve extra expenditure and yet perpetuate the nineteenth-century condition of anatomy departments. However, such an arrangement is certainly justified where my suggestion is not practicable for immediate adoption due to the teachers of anatomy not being qualified to perform clinical duties. It follows that wherever they possess the experience and qualifications prescribed for holding senior clinical appointments, and several of them do possess, they must receive preference over raw additional teachers. This may amount to reversion to an old practice, yet this is the only way that frequent quits from the anatomy

department can be prevented and research as well as teaching in anatomy can be improved.

This suggestion is in keeping with the basic recommendations made by the Conference of Representatives of Universities and Royal Colleges in England in 1935 and conforms to the practice in vogue in certain institutions in this country as well as in the West. Senior teachers of the department of anatomy in association with junior ones should form a Clinical Anatomy Unit. Such an unit must hold full charge of beds in the hospital attached to the teaching institution according to the experience and qualifications of the chief. Their teaching experience in anatomy must be considered an additional qualification, and not a stigma, for holding a part-time clinical appointment if the person is otherwise qualified to do so. In case it is not possible to have two units in the anatomy department the purpose in view can be served by posting the Clinical Anatomy Unit on the surgical and Clinical Physiology Unit on the medical side of the teaching hospital. It must be pointed out that no useful purpose will be served by attaching, as recommended by the Bhore Committee, only a junior demonstrator of anatomy to the hospital or associating a part-time 'clinician of the status of a registrar' with an anatomy department where all the senior teachers continue to be academic anatomists and can teach only cadaveric anatomy. The demonstrators or registrars in India are only fresh graduates with rusty knowledge of anatomy and no teaching experience. Obviously the recommendations of the Bhore Committee are based on the old conception of cadaveric anatomy being taught by academic anatomists completely divorced from the teaching hospital. In view of the pendulum of current opinion having swung in favour of teaching 'living anatomy', their recommendations appear to me as very much out of date.

Preparation of textbooks

The necessity for the proper textbook is a real problem. The older ones have had their days. Among the modern ones, *Anatomy for Medical and Dental Students* by Mainland, Dalhousie University, Halifax, Canada; *Practical Anatomy* by Le Gros Clark, Oxford; *Surface and Radiological Anatomy* by Appleton, London, deserve mention. There is still a great demand for a new textbook written jointly by teachers in India. A work on Basic Anatomy including principles of embryology, post-natal growth and 'living anatomy' is a crying necessity. I wish this problem was taken up by the Indian Medical Council, in the absence of any association of anatomists, to standardize the teaching of anatomy in the country.

Reorientation of the system of examination.—The university examination should be held at the end of the second academic year.

1. *Written.*—Of the two papers on anatomy one should be allocated to questions on living anatomy and the other may conform to the old

pattern; or, alternatively, each paper may be modified to incorporate modern trends.

2. *Practical.*—Fifty per cent of marks may be assigned to the existing items—dissection and *viva voce* on bones, soft parts, as well as models. The balance may be earmarked for testing candidate's knowledge of living anatomy. This part of the examination should include questions on radiographs, surface and clinical anatomy. Candidates may be shown cases and asked to pick up the normal side, to explain the anatomical basis of signs and symptoms, mark out viscera by palpation, percussion, auscultation, etc.

Teaching of Clinical Anatomy in senior classes

One of the outstanding defects in the existing system is the lack of regular courses in anatomy by teachers of the subject during the clinical years in spite of specific recommendation by Indian Medical Council to that effect and their endorsement by the Bhore Committee. The necessity of such courses being given regularly can hardly be overstated. The proposed Clinical Anatomy Unit is best suited to conduct such courses. They should comprise bedside or outpatient and theatre demonstrations for two hours per week during the first two terms of third and fourth years and throughout the final year.

Summary and conclusions

1. That the standard and methods of teaching anatomy to undergraduates require immediate revision. The old conception of cadaveric anatomy being taught for two years as a preclinical subject by academic anatomists is untenable.

2. That the undergraduate standard should include principles rather than gross details of the development and structure of the body. The term 'basic anatomy' is recommended for the purpose.

3. That basic anatomy should consist of :—

- (i) Principles of Embryology.
- (ii) Principles of Post-natal Growth.
- (iii) Principles of Living Anatomy.

4. That living anatomy should be the end of undergraduate teaching and cadaveric anatomy the means to that end.

5. That cadaveric anatomy can be learnt during the first year in about 600 hours. Study of bones and soft parts should go side by side.

6. That living anatomy can be learnt during the second year in about 300 hours and should include :—

(i) Surface anatomy including minor endoscopy.

(ii) Radiological anatomy including fluoroscopy, plain and contrast radiography of the normal.

(iii) Clinical anatomy including introduction to clinical methods, *viz*, inspection, palpation, percussion and auscultation, with a view to correlating dissection with living anatomy and clinical work.

7. That teaching of clinical anatomy should be carried out in the hospital attached to the school by teachers of anatomy constituting the Clinical Anatomy Unit with effect from the beginning of the second year and last throughout the curriculum.

8. That modern textbooks are urgently required.

9. That the system of examination needs modifications.

10. That the two spare hours per day in the second year should be utilized for the study of elementary pathology and preventive medicine with a view to welding together the disjointed preclinical and detached clinical parts of the under-graduate curriculum.

11. That the introduction of the proposed changes will not only help in bridging the harmful gap between preclinical and clinical studies but will also permit the completion of courses in the senior classes about six months earlier. If vacations are curtailed, the entire medical course may not require more than four calendar years in view of overlapping in courses and concerted effort in teaching only fundamentals instead of details.

12. That the universities concerned are requested to introduce necessary reforms at the earliest possible opportunity.

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Other complete references have been given in the text.

USE OF HYDROGEN PEROXIDE AS A MILK PRESERVATIVE

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[Read at the Indian Science Congress, Delhi, January 1947]

THIS work was undertaken at the instance of an official enquiry prompted by a commercial firm in order to know whether a limited amount of hydrogen peroxide can be used in preservation of milk for 48 hours longer than raw milk under ordinary condition. Under the Public Health Regulation now in force in the U.K. or India hydrogen peroxide has been classed as a non-permitted preservative in foodstuffs. Although

any kind of preservative in a foodstuff has been prohibited under the general restriction order, it is doubtful whether such a course is expedient in the case of hydrogen peroxide where a very small amount is necessary to preserve the milk with hardly any loss of its taste, quality and nutritive value. Besides, the chemical itself on remaining in contact with the organic matter of the foodstuff breaks up into nascent oxygen and water, leaving it quite harmless.

Specially purified metallic free hydrogen peroxide is now being prepared by electrolysis in some places in Italy. In many areas of this country milk is actually being treated by the chemical with success (Romani, 1944). Therefore there is no reason why this method should not be adopted in India where there is an acute shortage of milk in big cities like Calcutta. By treating it with a small dose of the preservative this valuable article of food can be brought here within 48 hours from many distant places where it is found in plenty and can thus solve the milk problem.

The practice of adding hydrogen peroxide to milk was in vogue long ago. Budde, the Danish Engineer, first thought of treating milk simultaneously with heat and hydrogen peroxide. The milk so treated is termed 'Buddeised milk' after his name. By this process one litre of milk is mixed with 15 c.c. of hydrogen peroxide solution of 3 per cent strength. The whole thing is heated for 3 or 4 hours continually at 51°C. The enzymes, viz, peroxidase and catalase present in milk, decompose the hydrogen peroxide into nascent and molecular oxygen respectively as well as water. The nascent oxygen and heat act conjointly to destroy the bacteria. The result is that we get a milk which remains fresh for 4 days (*vide table I*) without any loss of taste due to the addition of hydrogen peroxide. Yet the method is open to objection on the ground that it is not only impracticable from the commercial viewpoint, but that the continued action of heat and oxygen act deleteriously upon the vitamins present in the milk. Besides, the commercial hydrogen peroxide solution is likely to add poisonous impurities to the milk (Harvey and Hill, 1937). However, the variety of H_2O_2 solution that has been used in the experiment has been tested to be free of such impurities except a little citric acid and sodium salt. In order to avoid this sort of trouble as also instability of its strength, solid compound of hydrogen peroxide with urea has been prepared in the laboratory in the following way. This compound is perfectly stable in the dry state at ordinary temperature and its equivalent amount has been used in the experiment just as liquid H_2O_2 solution without any difference (*vide table II*).

Method of preparation

1.8 gm. of urea is dissolved in 30 c.c. of alcohol. To this are added gradually with gentle shaking 30 c.c. of H_2O_2 solution of 10 vol.

strength. A trace of citric acid is then added to the mixture for stabilizing the hydrogen peroxide. The whole thing is kept overnight in ice chamber. The alcohol from the mixture is then distilled under reduced pressure at ordinary temperature (35°C.). The residue is poured over a shallow dish and treated with a little absolute alcohol and left under electric fan to evaporate slowly. After a while beautiful, white prismatic crystals of urea peroxide, $\text{CO}(\text{NH}_2)_2$, H_2O_2 appear. These are drained as far as possible from the mother liquor and then washed with a little absolute alcohol to free them from impurities. They are then dried over calcium chloride under vacuum.

The strength of the crystal in terms of H_2O_2 has been determined to be 30 per cent (theoretical—34 per cent). The compound is hygroscopic. It decomposes at 60°C. into urea, water and oxygen. It is otherwise quite stable in the dry state and can be compressed into tablets. One gramme of the tablet dissolved in 10 c.c. of water produces H_2O_2 of 10 vol. strength. Each tablet weighing 16 grains is enough to keep a pint of milk fresh for 48 hours if kept in an open vessel. Any trace of H_2O_2 is hardly perceptible to the palate after the interval. It completely disappears on heating the milk.

TABLE I

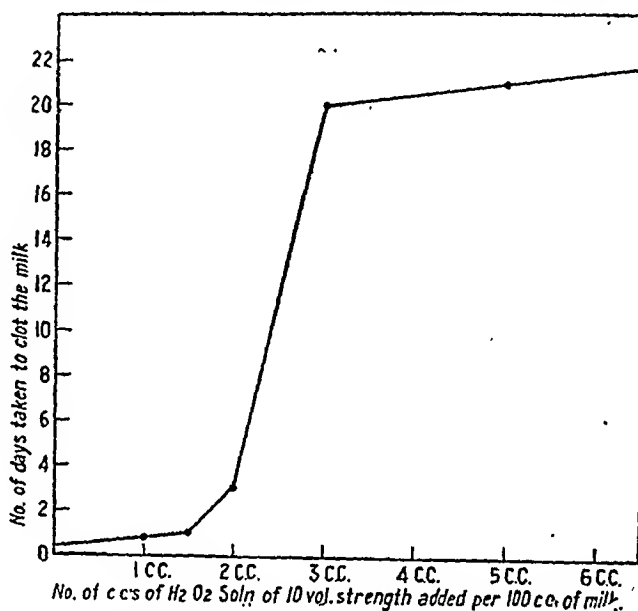
Date of experiment—27th September, 1946
Finding the dose of H_2O_2 per 100 c.c. of raw milk

Nature of milk	Dose of H_2O_2 soln. (10 vol. O) in c.c. added to 100 c.c. of milk within 3½ hours of collection	Time of clotting
1. Raw cow milk (pure) ..	1.0	24 hours.
2. Do. do. ..	1.5	Do.
3. Do. (Buddesised)	1.5	4 days (closed bottle).
4. Raw milk (above) ..	2.0	3 days (open bottle).
5. Do. ..	3.0	18 days.
6. Do. ..	5.0	Not clotted after 20 days.
7. Pasteurized (Keventer)	5.0	21 days.
8. Do. ..	7.5	Do.
9. Raw milk (pure) ..	7.5	Not clotted after 20 days.

In order to find the minimum dose of H_2O_2 , 100 c.c. of the same raw milk of acidity 16° are taken, in several uniform conical flasks and treated with progressive doses of H_2O_2 of 10 vol. strength within 3 hours of milking cow. The flasks are plugged with cotton-wool and kept at laboratory temperature (85°F.) for observation. It has been found that with doses below 2 c.c. of the peroxide solution, the milk invariably curdles within and after 24 hours,

while the milk having this dose remains fresh for at least 3 days if kept in an open flask. The closed flask containing the dose just decomposes within 48 hours (*vide* table V).

Observation has also been made on Keventer's pasteurized milk as well as on raw milk with higher doses of the H_2O_2 solution, which keep it fresh for about 3 weeks. It has been calculated that roughly 2/5ths of an ounce of H_2O_2 solution of 10 vol. strength costing about ½ an anna is enough to keep a pint of milk sweet for 48 hours. One company is understood to manufacture it at 10 as. per lb. A graph has been drawn showing relationship between the doses of peroxide solution and the number of days to clot the milk.



Experiments were conducted to compare the action of the urea peroxide compound with that of the H_2O_2 of 10 vol. strength. 100 c.c. of the same raw milk were taken in each of the five uniform conical flasks. To the flask A is added 0.12 gm. of the compound equivalent to 1 c.c. of H_2O_2 solution. To the flask B 1 c.c. of H_2O_2 solution is taken. To the flask C 0.24 gm. of the compound and to the flask D 2 c.c. of the H_2O_2 solution are added respectively. The fifth flask O containing only milk serves as the control. All the flasks are plugged with cotton-wool and kept for 24 and 48 hours for observation. The results are as shown in the table. There is hardly any difference between the solid compound and its equivalent of H_2O_2 solution so far as keeping quality and taste are concerned. It is noticed that with the insufficient dose of either, no trace of H_2O_2 is found to be present, but peroxidase remains, while with the proper dose or above, H_2O_2 persists during the interval to the total destruction of the peroxide.

This experiment is performed with a view to knowing what effect the optimum dose, *viz* 2 c.c., produces on the raw milk after 48 hours so far as the analytical constants, vitamin A and vitamin C are concerned.

TABLE II

Date of experiment—27th November, 1946. Comparison of the solid urea compound with liquid H_2O_2 solution

Nature of milk	RESULT AFTER 24 HOURS			RESULT AFTER 48 HOURS			REMARKS
	Acidity	H_2O_2	Perox- idase	Acidity	H_2O_2	Perox- idase	
O. Raw milk (acidity 16°) ..	70° (curdled).	Nil	Present	Curdled	Nil	Present	
A. Do. c. 0.12 gm. of urea compd. (equiv. to 1 c.c. of H_2O_2) per 100 c.c. of milk.	19° (st. acid).	Nil	Trace	Curdled	Nil	Trace	Just decomposes after 24 hours.
B. Do. 1 c.c. of H_2O_2 soln. per 100 c.c. of milk.	21° (decomp.).	Nil	Trace	Curdled	Nil	Trace	Decomposes after 24 hours.
C. Do. c. 0.24 gm. of urea compd. (equiv. to 2 c.c. of H_2O_2) per 100 c.c. of milk.	16° (good).	Present	Nil	17°	Trace	Nil	Decomposes after 3 days.
D. Do. c. 2 c.c. of H_2O_2 soln. per 100 c.c. of milk.	17° (good).	Present	Nil	18°	St. trace.	Nil	Decomposes after 3 days.

TABLE III

Date of experiment—11th December, 1946. Effect of the optimum dose on the vitamins and the analytical figures

	Percentage of fat	Percentage of lactose	Vitamin C	Vitamin A	REMARKS	
Raw milk	5.8	4.44	0.25 mg. per 100 c.c.	0.7 I.U. per c.c.	Normal	
					Vitamin C 0.7 mg. per 100 c.c.	Vitamin A 2 I.U. per c.c.
Result after the addition of H_2O_2 soln. (2 c.c.)—						
(a) After 1 hour ..	5.8	3.91	0.14 mg.	..	..	..
(b) After 24 hours ..	5.8	3.90	0.11 mg. (cf. 0.19 mg.)	..	..	Raw milk
(c) After 48 hours ..	5.8	3.90	0.10 mg.	0.7 I.U.	..	..

It is found that the fat percentage remains unaltered but the lactose is lightly reduced due to oxidation; vitamin A remains unaltered, while vitamin C decreases by 44 per cent from the original value. In passing it is noticed that the raw milk under experiment is rather poor in both the vitamins compared with normal milk. The reason is that the cow is stall fed and not allowed to graze. In India the question of deriving vitamin C from milk is ruled out in as much as the people generally use milk after boiling. This destruction of vitamin C by H_2O_2 may, however, be compensated by taking supplementary food, e.g. orange juice, etc.

Experiments were conducted to note what difference it makes by taking milk in closed bottles as well as in open bottles with 1 c.c. and 2 c.c. of the H_2O_2 solution per 100 c.c. of milk. In table V the experiment was done in a confirmatory way. It was found that the milk in the open bottle kept longer than in the closed bottle and during the same period more acidity developed in the latter. The reason why this is

TABLE IV

Result after addition of different doses of H_2O_2 solution to closed bottle as well as to open bottle to 100 c.c. of milk

After 24 hours

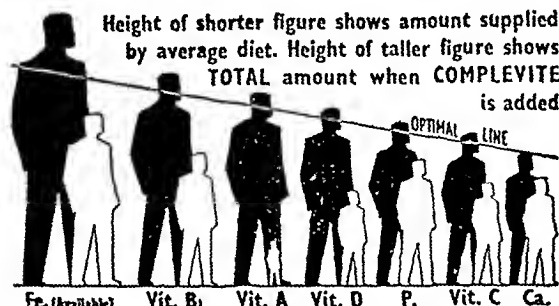
	Dose of H_2O_2 soln.	Acidity	H_2O_2	Peroxidase
Open bottle	Nil (raw milk).	89° (decomp.)	Nil	Present
	1 c.c.	22° (curdles on heating).	Nil	Trace
	2 c.c.	16° (good).	Present	Nil
	After 48 hours			
	Nil (raw)	106° (decomp.)	Nil	Present
	1 c.c.	70°	Nil	Nil
Closed bottle.	2 c.c.	16° (good)	Present	Nil
	1 c.c.	73° (decomp.)	Nil	Nil
	2 c.c.	28° (curdles on heating).	Nil	Nil

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1. Vogt-Moller, P., Tier. Rund., 1942, 48.

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CASE HISTORY

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TABLE V (confirmatory)

Result with 2 c.c. of H_2O_2 solution after 48 hours

	Acidity	Peroxidase	H_2O_2
(1) Open bottle	16°	Nil	V. M. trace
(2) Closed bottle	21°	Nil	Nil
(3) Raw milk without H_2O_2 .	78°	Present	Nil

so will be ascertained in the subsequent investigation.

Summary and conclusion

The minimum dose of hydrogen peroxide solution to preserve the milk for 48 hours is found to be $2/5$ ths of an ounce or 16 grains of the solid compound per pint. The milk so treated

should be kept preferably in an open vessel. Vitamin A is not affected but vitamin C is somewhat reduced. The analytical constant, viz fat percentage, remains the same, while the lactose percentage is slightly reduced. The taste of milk is hardly altered by the small trace of H_2O_2 left behind which, however, disappears on boiling.

My thanks are due to the Director, All-India Institute of Hygiene and Public Health, and to the Director, School of Tropical Medicine, for their interest in the work.

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Current Topics, Etc.

The Use of Tantalum in Tendon Reconstruction of the Hand

By R. C. PEARLMAN

(Abstracted from the *United States Naval Medical Bulletin*, Vol. 46, November 1946, p. 1647)

In tendon reconstruction, active and passive motion are demanded within a few days following surgery to reduce the inevitableness of permanent immobility. To keep the swelling at a minimum the following criteria must be observed: (a) Traumatize the tissues as little as possible; (b) there must be no constrictive tissue; and (c) the proper application of a pressure dressing.

To permanently prevent adherence and obtain freely functioning tendon, the writer reports in this article his personal experience in the use of tantalum as an interpositional substance. Various metals and alloys have been buried in the tissues of the body by surgeons for the past 3 or 4 hundred years. For a metal or an alloy to be satisfactory in the presence of tissue fluids it must be 'inert' physically and chemically. After fulfilling this basic requirement, further physical characteristics of a metal or alloy should possess are: (1) its ductility, that it can be 'cold-rolled' and its ability to be tempered to various degrees of hardness. It was not until 1936 that a 'metal-like' material was produced that fulfilled any of these requirements. That was vitallium, an alloy of the following consistency: cobalt 65 per cent, chromium 30 per cent and molybdenum 5 per cent.

Vitallium possesses only one of the chemico-physical properties listed, 'inertness' in the presence of the body fluids. Screws, nails and plates of this alloy are in use, especially in bone work, but all have to be cast. It cannot be drawn into wire or shaped with a hammer at the operating table. Since the stainless steels vary so much in composition, they all, so far, irritate the tissues, and their use is limited almost entirely to sutures. At present, there is only one metal-like substance that possesses four of the necessary chemico-physical properties. It is tantalum.

Tantalum is a basic element discovered by Ekeberg of Sweden in 1802. It possesses the following properties: (1) Inertness, (2) malleability, (3) ductility, (4) it can be cold-rolled. It can be purchased as sutures, ribbon, foil, plates and screws. Laboratory studies show that there is no inflammatory reaction when tantalum is buried in the tissues. It appears totally inert. The tissues in contact show no tendency of disintegration and the tantalum appliance does not loosen or cause

a foreign-body reaction. It handles easily as suture material of various sizes but the writer would like to see a finer-sized suture and an increase in tensile strength. Tantalum plates, of varying thickness, are extensively used in neurosurgery, following bone losses of the skull, and the foil is used to prevent adherence between the cerebral and meningeal surfaces.

In the writer's reconstructive work he has been using tantalum foil 0.00025 inch in thickness as an interpositional material. It has improved the functional results of tendon work and often has made it unnecessary to resect a scarred and adherent tendon. Tendon with raw surfaces was simply encased within tantalum foil and the foil held in place with catgut ligatures. The tantalum-wrapped tendon was then dropped back into its normal channel. A pressure dressing was applied and the part immobilized for three or four days. At the end of that time active and passive motions were begun. The pressure dressings were reapplied and no splinting was necessary. The tantalum foil did not need to be removed. Examination of the tendon at the end of four to six weeks showed the tendon 'free' in its channel. The foil was found fragmented and closely adherent in part to adjacent tissues. The tendon itself was coated with a glistening layer of cells. The gauge of foil was not always available, and the writer then was forced to use heavier foil. The results with the heavy foil contra-indicate its use, as it slid about, often causing pressure necrosis of the skin, and in addition it had to be removed, making another operation necessary.

The writer feels that the results he has obtained with tantalum foil justify its continued use.

Penicillin in the Treatment of Louse-Borne Relapsing Fever

By H. S. INGRAHAM

and

R. G. LAPENTA

(Abstracted from the *United States Naval Medical Bulletin*, Vol. 46, November 1946, p. 1719)

1. FIFTY-two patients with Egyptian louse-borne relapsing fever received 1,000,000 units of penicillin each in 25,000 unit doses intramuscularly every 3 hours. A cure of the relapsing fever was obtained in all 52 cases.

2. No relapses occurred in the treated group.
3. Relapse occurred in 87 per cent of the 53 cases used as controls.

Leptospirosis Canicola A Case treated with Penicillin

By M. D. BABER
and

R. D. STUART

(Abstracted from the *Lancet*, ii, 26th October, 1946, p. 594)

A CASE of leptospirosis canicola in a boy is ascribed to bathing in the Thames.

The diagnosis was established by the demonstration of a rising serum antibody titre to *L. canicola* during the course of the illness and by absorption tests with homologous and heterologous strains of leptospira.

The patient was treated with 220,000 units of penicillin, and dramatic clinical improvement followed.

Experimental Gonorrhoea

(Abstracted from the *British Medical Journal*, ii, 12th October, 1946, p. 549)

CERTAIN facts which emerged may be recapitulated briefly. Cultured strains of gonococci failed to cause clinical disease with any consistency, and the older the strain the less likely it was to prove effective. The most successful method of conveying infection was by transferring pus from an acute case directly to the urethra of a volunteer, but even this method sometimes failed to infect. A heavy inoculum, deep insertion into the urethra, and the use of mucin or peptone solution rather than saline—which was shown to be toxic to the gonococcus—increased the chances of success. Patients infected with sulphonamide-resistant strains did not respond to sulphonamide therapy but were cured by penicillin. Those with a positive seemed less liable to infection than those with a negative complement-fixation test, and the same applied to volunteers with a previous history of gonorrhoea. The incubation period of experimental gonorrhoea averaged 3 to 5 days, with extremes of 1 and 31 days. When originally examined 1 per cent of the volunteers harboured typical gonococci without showing clinical signs, and were therefore carriers.

Cutaneous Anthrax

By H. V. ELLINGSON *et al.*

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 3rd August, 1946, p. 1105)

ALL patients in the present series (25) were treated with penicillin in total dosages ranging from approximately 1,000,000 units to over 4,000,000 units. Since the first 3 cases occurred at a time when, to our knowledge, penicillin had not had clinical trial in this infection, these three individuals also received sulphadiazine orally in doses sufficient to maintain blood levels above 8 mg. per hundred cubic centimetres for from four to eighteen days. In the remaining patients penicillin was used alone. In general, the plan of therapy was to give 60,000 units intramuscularly in each of five doses, followed by 30,000 units every three hours by the same route. Deviations from the standard programme occurred in several cases when larger doses were given and in 2 cases when penicillin was administered by continuous intramuscular infusion for brief periods. In most cases dressings applied to the lesions were kept moist with penicillin in saline solution (1,000 units per cubic centimetre) for seven days. In general, intramuscular penicillin therapy was continued until the following criteria were met: (1) Oedema

had begun to recede, (2) cultures from lesions were negative for *B. anthracis*, (3) systemic symptoms had subsided, and (4) lesions were drying. Blood penicillin levels were not determined. No other treatment was given other than acetyl-salicylic acid for symptomatic relief and general supportive measures. All patients were kept at bed rest during the acute phase of their infections and, when possible, affected parts were immobilized.

All recovered uneventfully in spite of the fact that *B. anthracis* was isolated from the blood stream of 3 of these patients prior to treatment. Under treatment, 14 of the patients showed only slight systemic reaction or none at all. Furthermore, the disappearance of viable anthrax bacilli from the lesions in twenty-four hours or less in 22 of these cases is considered significant.

The Use of Para-Aminobenzoic Acid in Endemic (Murine) Typhus

By P. K. SMITH

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 3rd August, 1946, p. 1114)

1. A SERIES of 29 patients with endemic (murine) typhus were given 2 gm. of para-aminobenzoic acid every two hours until their temperatures returned to normal.

2. The number of days of fever in patients receiving this treatment was, on the average, significantly less than in a comparable series of patients not receiving the drug.

3. No toxic effects that could be attributed to para-aminobenzoic acid were observed in a group of 46 patients, each of whom received an average of 95 gm. of the drug. Twenty-nine of these patients had murine typhus.

4. It is recommended that a thorough clinical trial be made of this drug, using a larger number of patients under more rigidly controlled conditions. Such trials should include appropriate studies designed to detect any early toxic effects.

Boric Acid as a Stomach Poison for the German Cockroach

By O. S. BARE

(From the *Journal of Economic Entomology*, Vol. 38, 1945, p. 407, as abstracted in the *Review of Applied Entomology*, Vol. 34, Series B, October 1946, p. 167)

BAITS composed of 10 per cent powdered boric acid with a mixture of equal parts of honey and butter and with powdered confectioners' sugar gave 80 per cent kill in 9 and 13 days and complete kill in 16 and 21 days, respectively. Nymphs that hatched in the jars containing these baits died in the first instar, whereas those that hatched in control jars developed normally. Both baits were eaten readily even in the presence of common foods, and would be particularly suitable for use where quicker acting and more violent poisons might be dangerous.

The Modern View of Gold Treatment in Rheumatoid Arthritis

By G. D. KERSLEY

(Abstracted from the *Medical Press and Circular*, Vol. 216, 23rd October, 1946, p. 296)

SEVERE reactions are rare if one of the less toxic crystalloids are used in small dosage of not more than 50 mg. at a time, and if they are given intramuscularly at weekly intervals to a total of not more than 1.0 gm. per course. In only about 12 per cent of cases will it be necessary to cut short the course, the commonest

cause of annoyance being a dermatitis, which is only occasionally severe. In such cases the patient has the consolation that he is almost invariably cured, at least for a time, of his arthritic symptoms. Since the introduction of penicillin the fear of the consequences of agranulocytosis has disappeared, since it is infection, not the drop in the polymorphonuclear cells themselves, that kills. Thrombocytopenia is, however, still a dangerous but moderately rare result of gold treatment, though the use of vitamin K may assist in reducing its terrors. A moderate degree of albuminuria without red cells in the urine is not an indication for cessation of treatment.

With regard to the preparation of gold to be used, either myocrisin (sodium aurothiomalate) or auro-calcium (calcium aurithiomalate) are those most frequently employed in this country, the calcium salt being probably slightly less toxic. Calcium should be also administered by injection at the same time if the sodium salt is used.

Dosage must, of course, be regulated according to the patient's reactions, increase in pain in the joints, albuminuria, or slight fever being an indication that the dosage should not be increased. If, however, there are no complications the following course may be followed:

0.01 gm. \times 3 doses; 0.025 gm. \times 3 doses; 0.05 gm. \times 18 doses. Total—1.0 gm.

Within about a month there is frequently some diminution of pain and swelling, and perhaps an increase in sense of well-being and appetite. If there is any such improvement the course should be repeated in six to twelve weeks. If there is neither clinical improvement nor drop in the sedimentation rate, it is unusual to obtain any benefit from a second course.

In conclusion, it is fair to state that any case of rheumatoid arthritis, who has a rapid sedimentation rate, who is not definitely improving after a month or so of rest, both mental and physical, coupled with good food, analgesics and elimination of definite sepsis, should be given the benefit of gold therapy. If, during the course, a watch is kept on the skin and the urine and periodic platelet and white counts are done, then the risk of severe toxic symptoms is slight and is far outweighed by the likely therapeutic advantages.

B.C.G. : The Present Position in Britain

(Abstracted from the *Pharmaceutical Journal*, Vol. 157, 5th October, 1946, p. 216)

B.C.G. VACCINE consists of a suspension of living B.C.G., and its efficacy depends upon the number of living organisms contained in the suspension at the time of vaccination. But their life is short; too short to enable tests for sterility to be made before use, or to ensure that no virulent tubercle bacilli are present. The only way in which the purity of the vaccine may be ensured is by having it cultured and prepared under the strictest aseptic precautions in a special laboratory by a tuberculosis-free staff wearing masks during certain of the operations and preferably employed upon no other bacteriological work. The fulfilment of these requirements is costly, and special measures will undoubtedly be necessary to finance the production in this country of B.C.G., especially in the early stages when only limited quantities can be produced. It is proposed, therefore, to arrange for the production of the vaccine in this country under the auspices of the Ministry of Health.

So far B.C.G. vaccination has not shown such immunizing power as to make it a substitute for any of the existing methods of control and treatment. These are still essential and B.C.G. can be regarded only as a promising addition to existing measures. It is possible that, in time, avirulent strains of other bacilli of the tuberculosis group may be proved to have even greater immunizing power than B.C.G. The vole bacillus (*Mycobacterium tuberculosis muris*) is at present the only one whose potentialities in that direction look at all promising.

Pulex irritans

By B. DE MEILLON

and

D. H. S. DAVIS

(Abstracted from a correspondence in *Trans. Roy. Soc. Trop. Med. Hyg.*, Vol. 39, No. 6, June 1946, p. 544)

Pulex irritans, the human flea, has been shown to be capable of transmitting plague. MacArthur recently drew attention to its adaptation to a host other than man. This has a considerable bearing on the epidemiology of this disease. De Meillon now points out that from the flea survey in the Union of South Africa it has become apparent that this flea is not so restricted in its choice of host as is generally believed. It was found not only on the house rat but was collected also from different animals including domestic dog, domestic pig and domestic calf.

D. R.

Venomous Marine Molluscs of the Genus *Conus*

By L. C. D. HERMITTE, M.B., Ch.B., D.T.M. & H.

(Abstracted from *Trans. Roy. Soc. Trop. Med. Hyg.*, Vol. 39, No. 6, June 1946, p. 485)

THE fact that certain fishes can inflict either poisonous bites with their teeth or venomous stings by means of spines situated in their fins or in their opercula has been fully recognized. There are also fishes which are poisonous when eaten. The author has now discovered that certain marine molluscs belonging to the family Conidae and genus *Conus* may be responsible for serious and even fatal consequences to human beings. The accidents occur at the time of handling them when a sharp 'sting' is felt on the palm. These Gastropods are peculiar in possessing a special gland opening into the middle of the oesophagus known as the 'gland of Leiblin'. It has an irritating secretion which may be regarded as poisonous. A bite from such an animal is fatal only in exceptional cases; it often causes severe illness. The different species of *Conus* which can inflict such bites are *C. geographus* Linn. and *C. leopardus* Linn.; these inhabit the tropical island lagoons.

D. R.

A Case of Recovery of a Biliary Pulmonary Fistula

By A. SHEDROW

(Abstracted from the *South African Medical Journal*, Vol. 20, 10th August, 1946, p. 446)

THE patient, a male, 65 years of age, with no relevant past history except chronic bronchitis and cough, took suddenly ill, with acute pains in the right hypochondriac region. On examination, it was found that he had initial signs of dry pleurisy and later of basal pneumonitis on the right side. Sulphadiazine followed by penicillin treatment had no effect. Thereafter, the patient began to expectorate copiously, and the sputum did not suggest any extra-pulmonary condition. He was now in his third week. Laboratory examination of the stools were made for amœbæ, but the result was negative. At a certain stage the sputum looked slightly hæmorrhagic and thick, and suggested a possible lung carcinoma. An x-ray taken at the bedside did not suggest any malignant growth. At the fourth week a new and dramatic sign appeared. The patient complained that when he expectorated he had a very bitter taste in his mouth; the sputum changed its colour and consistency, and became distinctly yellow and most copious. Examination of the sputum revealed the presence of bile. He was put immediately on

emetine, and within seven days made a miraculous recovery.

The case was diagnosed as amœbic abscess of the liver which burst through to the bronchi and formed a hepato-pulmonary fistula through which the abscess drained. It is concluded that a possibility of liver abscess should be mentioned when a case with right-sided basal signs does not respond to chemotherapy even if laboratory findings are negative.

Diaphragmatic Flutter, with Symptoms Suggesting Angina Pectoris

By E. F. CAIN

and

E. R. WARE

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 27th July, 1946, p. 1058)

At 1 a.m. on 1st September, 1944, an elderly man was brought by ambulance to the writers' hospital. Information available at that time was that he had collapsed on one of the Oakland streets a few moments after alighting from a bus. He was brought to a civilian hospital where he stated that he was a recently discharged army officer. Because of this statement, communication with this hospital was made and he was quickly transferred here. When seen by the officer of the day, he complained of severe excruciating pain in the lower part of his left chest, associated with extreme dyspnoea, his statement being 'It seems as if my heart were only half working; can't get my breath'.

General physical examination showed that the patient was thin and moderately emaciated. Respiratory movements were shallow and restricted, owing, he said, to aggravation of his pain on inspiration. Two healed depressed scars were readily seen on each side of his neck. These, he stated, represented stab wounds inflicted by a Jap during the recent Tarawa invasion. A tattooed wreath of flowers was seen on his left arm 1½ inches above the wrist, and on the right arm a tattooed American eagle was found. The pulse at the wrist was 60. The heart rate at the apex was apparently extremely rapid and was variously estimated at 280 to 300 beats per minute. No abnormalities were found on clinical examination of the chest or abdomen. The peripheral tendon reflexes were normal. The pupils reacted normally. Some atrophy of the left half of the tongue was noted. Because of the apparent discrepancy between the pulse rate at the wrist and at the heart apex, a tentative diagnosis of auricular fibrillation was made; and because of his obvious pain and dyspnoea, morphine was considered necessary and he was placed in an oxygen tent. A bedside electrocardiogram was taken and showed an essentially normal tracing. A portable roentgenogram of the chest showed only elevation of the left half of the diaphragm, with displacement of the heart and aorta to the right.

The obvious incongruity of the findings gave rise to some informal discussion. Lieut. Sam Zlotnick, M.C., hearing this, was immediately impressed with the resemblance of the clinical picture to that presented by a patient whom he had seen in 1942 in a civilian hospital in Ohio and, remembering the scars on the man's face, he became convinced of his identity. After seeing the patient, Lieut. Zlotnick recalled the reports of hospitalizations on this person, and the exact determination of the patient's identity developed from a perusal of these and other records.

His course in the hospital was characterized by recurrences of chest pain and dyspnoea. Each episode developed spontaneously and apparently terminated in the same way. During the recurrences a fluoroscopic examination of the chest showed a flutter of the right portion of the diaphragm. Little or no motion of the left side could be detected.

Routine blood counts showed 3,580,000 erythrocytes and 7,700 leukocytes per cubic millimetre. The hæmoglobin was 73 per cent. The differential count showed

49 per cent neutrophils, 48 per cent lymphocytes, 2 per cent monocytes and 1 per cent eosinophils. The sedimentation rate was 31 mm. in one hour. A blood Kahn reaction was reported 'doubtful' on two occasions, but the blood Wassermann reaction was negative.

There are several points of interest in regard to this man's identity and unreliable accounts of his past history and occupations. He can be readily identified by the scars and tattoo marks. He has been registered under a number of different names and has claimed to have been a deep sea diver, a miner, a trapper, a Texas deputy sheriff and a retired regular army officer with extensive tropical service, terminating in this last war, where he states he was wounded in the neck in combat with the Japanese.

Besides the hospitalizations mentioned in the previous descriptions of this case we have ascertained that the man has been hospitalized in Weimar Sanitarium, Colfax, Calif., the Veterans Administration Facility, Livermore, Calif., the Dibble General Hospital, Menlo Park, Calif., and Highland-Alameda County Hospital.

It seems pertinent to publish additional information in regard to the further interesting course of this man.

Infectious Lymphocytosis in Brothers

By M. LORENZ *et al.*

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 13th July, 1946, p. 882)

Two boys presented the typical picture of acute infectious lymphocytosis as described in the literature. The salient features of the disease were the benign clinical course and the distinct leukocytosis with a high percentage of mature lymphocytes. The parallel onset and course speak highly in favour of a specific infectious agent as the cause.

In some of the earlier reports cases simulating infectious lymphocytosis were described as infectious mononucleosis. However, close analysis reveals consistent differences between the two conditions. The most striking difference is the decided increase in normal small lymphocytes in infectious lymphocytosis as compared to the slight or moderate increase in atypical lymphocytes in infectious mononucleosis. Further, the heterophil antibodies are not significantly increased in infectious lymphocytosis.

Our patients presented features not previously described in the literature that might be considered to favour a relationship to infectious mononucleosis. One of the boys had a palpable spleen; with the pronounced lymphocytosis, it is remarkable that this does not occur more commonly. The bone marrow hyperplasia found in both boys has also been noted in infectious mononucleosis. The presence of heterophil antibodies in a dilution of 1 : 80 has not been described by other authors. However, the fact that such titres occur in a variety of infections in children vitiates the significance of this mild reaction. The few atypical lymphocytes that appeared at the end of the disease may be considered to be a non-specific type. We feel that these features observed in infectious lymphocytosis are not sufficiently striking to identify the disease with infectious mononucleosis.

It might be further questioned whether infectious lymphocytosis is a variety of whooping cough. When first seen, both of our patients had a mild cough associated with a respiratory infection. There were no paroxysms, and the cough subsided in about a week, at which time the lymphocytosis was at its peak. In whooping cough the maximum lymphocyte count is usually reached in the paroxysmal stage about the second to the fourth week.

Reports of cases of infectious lymphocytosis have coincided roughly with the use of pertussis vaccine. Since our patients had previously received this vaccine, we considered the possibility of a subclinical type of whooping cough with a typical blood picture but without the usual cough or clinical course. Sauer has never observed such a picture in a large series of children who received pertussis vaccine.

From the data available, it appears that infectious lymphocytosis is a separate disease entity rather than an atypical type of infectious mononucleosis or whooping cough.

Sulphathiazole and Penicillin in Typhoid Fever

By C. J. McSWEENEY

(Abstracted from the *Lancet*, ii, 27th July, 1946, p. 114)

FIVE cases of severe typhoid were treated with sulphathiazole and penicillin.

The first case was given doses of penicillin appropriate for a staphylococcal infection, with no appreciable effect on the pyrexia or blood cultures, although toxæmia was much lessened, and there were no complications due to ulceration.

The next four cases were treated intensively with penicillin and sulphathiazole, receiving two courses each comprising 10,000,000 units of penicillin and about 34 g. of sulphathiazole given in four days. Speedy disappearance of toxæmia, subsidence of pyrexia, and disappearance of organisms from the blood, fæces, and urine followed the end of the second course in three of the four cases. In the fourth case, when the second course was postponed for about a fortnight, there was a relapse, which rapidly subsided when the second course was initiated.

The clinical effects appear to confirm the laboratory findings of Bigger.

POSTSCRIPT

Since this paper was submitted for publication another severe case of typhoid fever has been treated with penicillin and sulphonamides as follows:—

Case 6.—A girl, aged 17 years, admitted on 16th March, 1946, in the 3rd week of her typhoid, gravely ill, bordering on 'typhoid state'. Clinically enteric—abdomen very distended, spleen palpable, rose spots present, temperature 102°F–103°F, pulse rate 122–140, respirations 30–36 per min., Widal positive for *Bact. typhosum* 'H' to 1/250 and for 'O' to 1/50.

Because of the patient's grave condition it was decided to start penicillin-sulphonamide treatment before the result of the blood culture was available, and, accordingly, the system of treatment followed in the last 4 cases of the series described above was initiated on 18th March. The first course was finished on the 21st; the second began on the 24th and terminated on the 28th. After the conclusion of the second course the temperature, which had ranged between 100°F. and 104°F. while the treatment was being applied, underwent lysis and has been settled since 6th April. Toxæmia was much lessened from the time the treatment was started and was absent before the second course was concluded. The blood cultures taken on the conclusion of the second course were negative and ten samples each of fæces and urine examined during and subsequent to the treatment were negative for *Bact. typhosum*. No ulcerative accidents of any kind occurred, and the patient's condition gave rise to no anxiety after the conclusion of the second course of treatment.

There appears to be a strong *prima facie* case for extending this new line of treatment to the typhoid carrier state, and investigations along these lines are in progress in Eire.

Scorpion Sting

(From the *British Medical Journal*, ii, 2nd November, 1946, p. 680)

DR. B. V. RAMASWAMY (Bangalore, South India) writes: In the *Indian Medical Gazette* of November 1939, and January 1940, there were two small notes about scorpion sting. (i) 'Fresh leaves of *Acalypha indica* when rubbed well at the site of the sting relieve the pain and cure the patient in about five minutes.'

(ii) 'A few whiffs of chloroform inhalation almost immediately cure the pain. About 2 dr. (7 ml.) may suffice for nearly 50 persons.' Since then I have tried chloroform inhalations for scorpion stings with great success. There are two types of pain experienced by such patients. One is a local, throbbing pain at the site of the sting, and the other a rapidly spreading, shooting pain. If the patient gets the treatment within 5–10 minutes of the sting both the pains disappear in about 5 minutes. In cases where the treatment is begun after some time—more than half an hour after the sting—the shooting pain disappears in 5 minutes, but the local pain persists though in a bearable degree. To eliminate that pain I usually inject a local anæsthetic all round the site of the sting which gives complete relief. *Treatment*.—A few drops of anæsthetic chloroform are sprinkled over a small piece of cotton-wool and held near the patient's nostrils. He is then asked to inhale deeply a number of times. Most of the patients if treated early find relief of pain in 2–5 minutes. I would very much like others to try this simple treatment and report their experience. I would also like to know how chloroform neutralizes the toxins of the scorpion.

Agranulocytosis Induced by Aminopyrine Suppositories

By E. URBACH

and

H. L. GOLDBURGH

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 13th July, 1946, p. 893)

AN attack of nearly fatal agranulocytosis followed the use of twenty-four rectal suppositories of aminopyrine over a period of nine days amounting to 6.5 gm. (103 grains). Recovery was brought about by the administration of 1,275,000 units of penicillin given over a period of six days.

Memorandum on B.C.G.

(Abstracted from the *Lancet*, ii, 27th July, 1946, p. 138)

THE bodies sponsoring the memorandum ask that the use of B.C.G. should be encouraged, but feel strongly that its employment should not be allowed to discourage the search for more efficient means.

When Calmette advocated the administration of B.C.G. to newborn infants, he believed that it would provide sufficient protection to prevent a natural infection during the first year or two of life, and that sufficient resistance would remain to enable later infections to be overcome and to leave in their turn the higher grade of immunity associated with such recovery. This sequence represents perhaps the most effective result which any form of artificial immunization can produce. B.C.G. vaccination was advocated especially for children exposed to special risks, and it has been among these that the most successful results have been claimed in France.

Another application of preventive inoculation is the immunization of adolescents and young adults who are non-reactors to tuberculin. The value of pursuing this aspect has been shown in the vaccination of young nurses in Norway, where immunization of non-reactors has been followed by a significant decrease in morbidity and mortality rates as compared with unimmunized non-reactors, though both rates remain higher in the vaccinated than among the naturally infected reactors. The need for vaccination of this group in Great Britain is shown by the reports of the Prophit Trust investigations. The suggestion is that it should be available, though not compulsory, for non-reactor nurses. This would provide not only a practical safeguard against tuberculosis but a controlled investigation of the first value; there is little doubt that the results would be substantially the same as those obtained in Norway.

The introduction of the transcutaneous method, with its elimination of local abscesses, is felt to be an advance of the first importance; up to 1944 Birkhaug vaccinated 1,500 persons with a spring-actuated puncture instrument; 98 per cent became reactors and abscesses developed in none. There appears now to be no reason why B.C.G. vaccination should cause greater inconvenience, or rouse greater prejudice, than does prophylactic immunization against diphtheria.

It is believed that :

1. The harmlessness of B.C.G. is established beyond doubt.
2. A very considerable degree of immunizing efficiency is indicated by the most reliable results from other countries.
3. There exists in tuberculosis services and among the medical profession generally a desire that a reliable supply of B.C.G. vaccine should be available here, as it has been for years in other countries of the world.
4. The application by multiple puncture or by scarification promises to remove the risk of local abscesses, which has been one of the most serious obstacles to the general use of B.C.G.

On these grounds it is requested that the supply and use of B.C.G. vaccine in Great Britain should be facilitated and encouraged.

In the production of B.C.G. for general use it appears to be essential that: (1) the material should be actually safe; (2) there should be public confidence in its safety; and (3) control of production should be such that any claim of tuberculous disease being due to vaccination should be refutable with certainty. It is believed that, to attain these objects, there should be a single source of supply for Great Britain and that commercial competition should be avoided. It is also felt that the product should be supported with official backing, by being prepared under the auspices of a Government department or the Medical Research Council, or by certification of the methods employed which should be provided by an official department, such as the standards department of the Medical Research Council. Failing manufacture under Government auspices, it is felt that production should be controlled by some scientific organization of national repute, which should be subjected to official supervision and certification. Considering that in Norway, during enemy occupation, the number of vaccinations was increased from 603 in 1939 to 17,579 in 1944, it does not seem impossible that an adequate and reliable supply should be forthcoming in Great Britain.

The Syndrome known as 'Reiter's Disease'

By W. P. U. JACKSON

(Abstracted from the *British Medical Journal*, ii, 10th August, 1946, p. 197)

CLINICAL MANIFESTATIONS

The patient is usually a young adult male, presenting with an irregular fever and any one or more of the triad of essential symptoms. If one (e.g. the arthritis) occurs alone at first, the others (i.e. urethritis and conjunctivitis) develop later. The conjunctivitis is bilateral, catarrhal, or, more usually, profusely purulent, with episcleritis and sometimes an iritis or keratitis. There are local pain, weeping and photophobia, but permanent damage to the eye does not occur. No constant organism can be found in conjunctival smears. The arthritis is manifested by severe pain and tenderness, occurs in the large joints of the limbs, is usually polyarthritic and often fitting. Synovitis is frequent, fluid developing rapidly and in considerable amount. This fluid may be purulent, but is always sterile. The urethral discharge is abundant and purulent, accompanied by surprisingly little frequency of, or pain on, micturition. Gross hæmaturia may occur and renal complications have been described. The urine contains red blood cells in varying numbers,

clumps of pus cells, and a little albumin. The discharge presents no evident organism and is sterile on attempted culture. Erosions and small ulcers may appear on the penis from the constant irritating discharge.

Diarrhoea, sometimes severe and bloody, may be present at the onset, and several types of more or less generalized rashes have been described. The erythrocyte sedimentation rate is raised, there may be a mild hypochromic anaemia, and the leucocytes are normal or slightly raised in number. Gonococcal fixation and Wassermann tests are negative. The disease is self-limited, though subject to recurrences, which may drag its course out into months. Complications are very rare.

ÆTIOLOGY AND DIFFERENTIAL DIAGNOSIS

Harkness claims to have demonstrated inclusion bodies in the discharge from the urethra and conjunctiva in five cases of Reiter's disease. Apart from this all efforts to discover an infecting agent have failed, although the hypothesis of virus causation is the most popular. One thing seems certain—this is no venereal disease, and bears no relation to gonorrhoea or syphilis.

TREATMENT

Miller and McIntyre consider that putting the patient to bed for six weeks to three months is all that can be done. They found penicillin and sulphonamides to have no effect on their two cases. Protein shock therapy has been used in Germany, apparently with some success, especially by Beiglboeck. Sulphadiazine, however, seemed to have a good effect in a few cases.

CONCLUSION

The main importance of an awareness of the syndrome lies in its distinction from chronic gonorrhoea, thereby altering the prognosis and avoiding hectic treatment and the venereal stigma. It is probable, that Reiter's disease occurs much more commonly than is recognized, but it is considered that the symptom-complex described above is pathognomonic and should usually be unmistakable.

A Rare Iso-Hæmagglutinin

By J. J. GRAYDON

(Abstracted from the *Medical Journal of Australia*, Vol. II, No. 1, 6th July, 1946, p. 9)

OCCASIONALLY reports have appeared of unusual or irregular iso-hæmagglutinins which have been found in the blood of certain subjects and have occurred independently of the A,B,O, the M,N, and the Rh blood types. Most of these factors have been detected by means of 'cold' agglutinins, which are seldom active above a temperature of 30°C.

The serum of one donor (L. J.), who was of blood group O, had a titre of 1/250 for group A1 cells, 1/120 for group A2 cells, greater than 1/500 for group A2B cells, and 1/120 for group B cells in tests performed at 37°C. However this group O serum unexpectedly agglutinated cells G, also of group O, to a titre of 1/32 at 18°C. and 1/4 at 37°C.

Sixty-one samples of group O cells were not agglutinated by this serum. As Rh-positive, Rh-negative, P-positive and P-negative cells and all of the M,N types were well represented in this series, the 'new' antigen was probably unrelated to the Rh and M,N systems and the P-factor.

L. J. serum was used against samples of group O cells obtained from 91 Papuans and 39 Australian aborigines. None of these was agglutinated by L. J. serum. The specific antigen detected by the 'atypical' agglutinin in L. J. serum is evidently rare. The antigen, which had been given the tentative designation 'Gr', to distinguish it from the 'G' factor of Schiff, has appeared in three successive generations of G family, but so far has not been found in any subjects who are not close relatives of G. Hence it is apparently inherited as a

Mendelian dominant character unrelated to the A,B,O and the M,N blood types. Its rareness in the white population indicates that it is not related to the P factor or to the 'Lutheran' antigens.

It may be identical with the 'Levy' antigen, but the rareness of both makes this unlikely. Further, the 'Gr' agglutinin was more active in the cold than at 37°C., where the 'Lutheran', 'Willis' and 'Levy' antibodies were more active at 37°C. than at lower temperatures. It is worthy of note that the 'Gr' agglutinin could be absorbed with G cells to leave a normal group O serum of high titre. Also it was found possible to absorb the anti-A1, anti-A2 and anti-B agglutinins from the original serum, leaving a fluid which could be used to detect the 'Gr' antigen in cells of any group.

The donor (L. J.) was an unmarried girl, aged eighteen years, with a clear medical history. She had never had a blood transfusion, and no reason for the development of the unusual agglutinin could be found.

The specific agglutinins are preserved by freeze-drying samples of the serum in ampoules.

Application of the Rh Blood Types and Hr Factor in Disputed Parentage

By ALEXANDER S. WIENER, M.D.

(Abstracted from the *Journal of Laboratory and Clinical Medicine*, Vol. 31, No. 5, May 1946, p. 575)

THE proper application of the rules of inheritance of Rh and Hr requires considerable genetic and serologic knowledge and lawyers, in particular, have requested detailed tables listing all the possible matings for reference use. The tables are far more elaborate than in the case of the blood groups and M-N types, and some of the matings involve rare types which will hardly ever be encountered in practical work. Nevertheless, in view of the need for such a complete set of tables, this paper was prepared.

Blood not agglutinable by any of the three Rh antisera is said to be Rh negative, or, more simply, is said to belong to type rh. Types Rh', Rh'', RhRh'', and rh₀ are named after the antisera with which these bloods react. Type Rh₁ reacts with the two anti-scr_a, anti-Rh' and anti-Rh₀, and Rh₁ is merely an abbreviation for Rh₁'; similarly, Rh₂ is short for Rh₂'. Types Rh₁ and Rh₂ are so named, instead of RhRh' and RhRh'', respectively, to indicate that the two factors Rh₁ and Rh₂ in the former, and the factors Rh₀ and Rh'' in the latter behave like 'partial' antigens in complex agglutinogens which are, as a rule, hereditarily transmitted as units by the corresponding genes, R' and R''. Type rh₀ is printed with a small 'r' to indicate that this type bears a similar relation to types Rh₁, Rh₂, and RhRh₁, to that which type rh bears to Rh', Rh'', and RhRh''. In giving the names of the Rh types verbally, however, it is not necessary to say small 'r' or large 'r', as the case may be, because the qualifying subscripts and superscripts will prevent any ambiguity.

According to the theory of six allelic genes, the eight Rh blood types are hereditarily transmitted by means of a series of allelic genes, r, R', R'', r⁰, R¹, and R².

When the 8 Rh blood types are applied in cases of disputed parentage, the practical consequences of the theory of six allelic genes can be summarized in the following two rules: (1) The factors Rh₁, Rh', and Rh'' cannot appear in the blood of a child unless present in the blood of one or both parents. (2) When either parent belongs to type RhRh₁ or RhRh'', no child of type rh or rh₀ can occur. Similarly, parents of type rh or rh₀ cannot have children of type RhRh₁ or RhRh''.

In studies of the eight Rh blood types on a total of 300 families with 620 children, the writer has not encountered a single exception to these two rules of heredity.

However, that rare but valid exceptions to the second rule of heredity may eventually be encountered follows from the discovery of the rare Rh₃ gene by Murray,

Race, and Taylor and of the so-called intermediate genes.

The standard Hr factor occurs as a partial antigen in the agglutinogens determined by genes, r, r⁰, R', and R'' and is absent from the agglutinogens determined by genes R' and R'' (and R¹ and R²).

The designations of the sub-types were selected to indicate the most common genotype occurring among individuals of each subtype in question.

The results that can be drawn from the two laws of heredity when applying the Hr-Rh tests in cases of disputed parentage are presented in a table. By increasing the number of identifiable Rh blood types from eight to ten, the use of anti-Hr serum has considerably increased the number of possible matings.

The Absorption, Excretion and Toxicity of Streptomycin in Man

By D. G. ANDERSON

and

MARJORIE JEWELL

(Abstracted from *Bulletin of Hygiene*, Vol. 21, No. 5, May 1946, p. 329)

THE treatment of three patients with streptomycin is described, two were infected with *Salm. typhi*, a Group B Salmonella (blood culture positive in both), and one *H. influenzae* causing a meningitis. The response appears to have been decisive and rapid in the last named, but inconclusive.

Blood levels of streptomycin were determined after administration by different routes. There was no absorption when 6,000,000 units were swallowed probably due simply to non-absorption, since gastric juice was found not to inactivate streptomycin *in vitro*. When a single dose of 200,000 units was administered intravenously, a detectable blood level persisted for 8 hours: the curve following intramuscular injection was similar but for the absence of the immediate rise to a high level. Streptomycin is thus excreted or destroyed less rapidly than penicillin, and 6 or 8 hour intervals between doses are recommended. Examination of the urine showed that from 46 to 87 per cent of a single dose is excreted within 24 hours. There is little diffusion into the cerebrospinal fluid, but intrathecal injection of solutions containing 5,000 units per c.c. is apparently harmless and maintains a therapeutic level for 24 hours. Single intravenous injections caused transient headache and other unpleasant sensations and intramuscular injection caused pain; continuous intravenous administration is advised for prolonged treatment.

Permeability of the Human Placenta to Isoantibodies

By ALEXANDER S. WIENER, M.D.

and

EVE B. SONN

(Abstracted from the *Journal of Laboratory and Clinical Medicine*, Vol. 31, September 1946, p. 1020)

Two cases of erythroblastosis due to A and B sensitization are described.

Comparative titrations of the alpha and beta antibodies in the sera from cases 1 and 2 were carried out by the agglutination and conglutination techniques.

In the titrations carried out by the agglutination technique, it was found that the ratio of the antibody titres of the maternal and infants' sera was 8 : 1 in Case 1 and 64 : 1 in Case 2.

On the other hand, in tests carried out by the conglutination technique, the ratios of the titres approximated unity. The reason for the discrepancy

is that the two tests measure two different sorts of antibodies. The former test detects bivalent antibodies (agglutinins), while the latter test also detects univalent antibodies (glutinins). These results demonstrate, therefore, that glutinins traverse the placenta far more readily than agglutinins, in accordance with the expectations under the hypothesis that the former are comprised of smaller molecules.

It may seem somewhat puzzling that in both cases the univalent beta antibodies were more readily demonstrable in the maternal serum by the conglutination method than were the univalent alpha antibodies. The following plausible explanation for this apparent paradox suggests itself. It would be expected that univalent antibodies in general would continue to pass through the placenta from mother to fetus until their concentration in the fetal circulation became equal to that in the maternal circulation, thus setting up an equilibrium. In the case of the beta antibodies, such an equilibrium could be reached quickly; but in the case of the alpha antibodies, the antibodies would be neutralized or absorbed by group substances in the Group A fetus' body, delaying the attainment of equilibrium and at the same time gradually depleting the mother's body of the alpha antibodies.

The fact that in both cases described in this paper first-born infants were erythroblastotic calls for some comment.

In the first case, the patient stated that two years previously she had had an ovarian tumor removed and was given several post-operative transfusions of commercial, pooled human plasma.

With regard to the second case, the source of the sensitization could not be traced as definitely. However, it should be pointed out that A-like and B-like antigens are ubiquitous in nature, so that there would be many opportunities for A-B sensitization to occur in the course of a lifetime. For example, such antigens are present in horse serum and pig pepsin, so that injections of therapeutic horse serum or diphtheria toxin-antitoxin could bring about A-B sensitization. Moreover, such antigens are present in many bacteria and animal parasites, so that certain infections could cause A-B sensitization. The second patient did give a history of a severe attack of pneumonia several years before her first pregnancy, and possibly this was the source of her sensitization.

Guinea-worm

By T. S. SHASTRY

LIEUTENANT-COLONEL, I.M.S.

(Abstracted from *Journal of the Indian Medical Association*, Vol. XV, August 1946, p. 362)

DRACONTIASIS occurs in various parts of India where draught and water scarcity are present and where steep wells, ponds and pools are the sources of drinking water. The infestation causes pain and swellings in various parts of the body, specially the lower limbs and the joints therein, and the common sequelæ are arthritis, synovitis, ankylosis and contractures. For treatment of guinea-worm infestation the author recommends intravenous injections of 1 c.c. of 2 per cent aqueous solution of sodium antimonium tartrate every alternate day on an average of 3 injections, the usual precautions being taken. He submits records of 5 cases treated by him in this way with satisfactory results. As a prophylaxis he suggests a similar course of treatment for every new recruit who comes from an endemic area.

N. V. B.

Relationship of Benign Lymphocytic Meningitis and Glandular Fever

By H. TIDY

(Abstracted from the *Lancet*, ii, 7th December, 1946, p. 819)

THE clinical symptoms, course and prognosis of benign lymphocytic meningitis and of the neurological manifestations of glandular fever are indistinguishable.

The changes in the C.S.F. are identical in the two conditions.

In glandular fever with neurological manifestations the glandular enlargement is usually slight. This feature, together with mononucleosis and heterophil agglutinins, may only develop after the neurological symptoms have subsided, or may precede the nervous stage.

With the presence of such neurological symptoms, glandular fever can only be excluded by specific and repeated examinations.

Such examinations do not appear to have been performed in general in cases recorded as benign lymphocytic meningitis, and the possibility of glandular fever as a causal factor has consequently not been excluded.

Acute Infectious Mononucleosis complicated by Encephalomyelitis

By S. GELIEBTER

(Abstracted from the *Lancet*, ii, 23rd November, 1946, p. 753)

THIS case appears to be one of glandular fever in which the central nervous system was severely affected, followed by complete recovery. The Paul-Bunnell test was strongly positive (1-256) at the height of the nervous affection and became barely positive when the neurological signs had practically gone. Of particular interest is the fact that during the whole course of the disease there was a persistent leucopenia. At no time were the white cells more than 5,500; the lowest figure was 3,400. The mononuclears were never more than 7 per cent, the maximal lymphocytosis was 82.5 per cent. Tidy writes: 'It is evident that the virus of glandular fever transiently affects all the blood-forming tissues—and no single blood picture is typical of the disease.'

The C.S.F. never contained more than 9 lymphocytes per c.mm., even when the protein was 400 mg. per 100 c.cm. One might perhaps deduce that the small increase of white cells in the C.S.F. (and the consequent cell-protein dissociation) was ætiologically related to the leucopenia. This relationship, however, has still to be proved, just as much as the reputed relationship between the increase of leucocytes in the blood and in the C.S.F. On the other hand, the protein manifestations of the neurological lesion point to the fact that the brain and the spinal cord were involved. This should therefore be considered as a case of encephalomyelitis complicating an acute mononucleosis of a rather unusual type.

Had the sheep-cell agglutination test not been performed, the cause of the illness might have been missed. It is certainly worth while having a Paul-Bunnell test done in all cases showing acute neurological manifestations without apparent cause.

Sympathectomy in the Treatment of Peripheral Vascular Sclerosis

By G. DE TAKATS *et al.*

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 8th June, 1946, p. 495)

A GROUP of 25 patients suffering from vascular sclerosis of the lower extremities were treated with lumbar sympathectomy if after preliminary block of the lumbar sympathetics the temperature of the digits rose, if walking ability improved and if generalized vascular involvement was not extensive.

In one group of patients this resulted in a dramatic increase in walking ability.

In another group of patients given lumbar sympathectomy amputation was averted.

In a third group amputations could be performed at lower levels and in a fourth group intractable neuritic pain of the causalgic type was benefited.

In selected cases of peripheral arteriosclerosis lumbar sympathectomy has proved to be of great value.

A Clinical Syndrome following Exposure to Atomic Bomb Explosions

By P. D. KELLER

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 8th June, 1946, p. 504)

TWENTY-ONE patients who developed a delayed illness following their exposure to atomic bomb explosions in Japan were studied. The data on these few patients seem to indicate that the possibilities of developing this syndrome is not significantly affected by distance from the centre of the explosion as long as one is within a 2,000 meter radius. It is undoubtedly significant that only one patient is known to have been outdoors when the explosion occurred, and therefore people inside buildings were more apt to suffer from the delayed effects of atomic bombs provided they survived the initial effects. The delayed malady to some degree results from a generalized disturbance in human physiologic function, but the effects can be attributed principally to destruction or suppression of elements of the hemopoietic system (mainly granulocytes and thrombocytes) and to disturbance in liver function. The former effect produces a leukopenia (principally a granulocytopenia), thrombocytopenia, increased bleeding time and hemorrhagic tendencies with a resulting anemia, fever and weakness. The latter effect on the liver produces an albuminuria, tyrosinuria, hypoproteinemia, positive indirect van den Bergh reaction, jaundice and fever. The rapid sedimentation rate of erythrocytes gives evidence of extensive tissue destruction within the body. The similarity of this illness to that following excessive irradiation of the body with x-rays is striking.

Canities and Alopecia in Children associated with Avitaminosis

By A. P. CHAVARRIA *et al.*

(Abstracted from the *Journal of the American Medical Association*, Vol. 132, 9th November, 1946, p. 570)

IN Costa Rica infants and young children with severe avitaminosis, especially vitamin A deficiency, pellagra, riboflavin deficiency, beri-beri, nutritional edemas or mixed avitaminosis syndromes, have been observed to exhibit characteristic associated changes in the hair, loss, diffuse or in the frontal area, and changes in the hair resemble those reported previously by Trowell, Kirk, Williams, Gillman and Gillman and others in the syndrome of infantile pellagra in South Africa. These changes are easily reversible if the patient survives the severe vitamin deficiency state. Improvement may be produced by a general, adequate diet if it is utilized alone or together with poly-vitamin mixtures of the B complex.

The addition of biotin is thought, but not proved, to accelerate over other therapies the return of normal growth and pigmentation to the hair. Similar severe changes were not observed in the hair of adults with decided vitamin deficiency syndromes.

Animal Diseases and Man

(Abstracted from the *United States Naval Medical Bulletin*, Vol. 46, October 1946, p. 1599)

THE number of animal species alive on the earth has been estimated to be approximately 1,000,000.

There are about 3,500 species of mammals and 8,616 species of birds known in the world to-day. There are not more than 100 species of birds not yet discovered.

These warm-blooded animals have diseases which in some cases may be transmitted to man, and are consequently of great importance in preventive medicine. What is of almost equal importance, however, is the fact that many animals become immunized to agents not pathogenic to man in which the antibodies are curative of diseases of man.

Recently it has been demonstrated that the tubercle bacillus peculiar to voles may be used to vaccinate guinea-pigs which are then found to be protected against mammalian tuberculosis.

This of course suggests the vaccination of man with this vole-type bacillus in order to protect him against ordinary tuberculosis.

This example shows the great possibilities in disease prevention from the study of the diseases and immunization of animals from the view-point of immunity developments of value in preventing human diseases due to similar strains of causative organisms.

The Antibacterial Action of Garlic

By M. A. GOHAR *et al.*

(Abstracted from the *Journal of the Egyptian Medical Association*, Vol. 29, March and April 1946, p. 90)

THE antibacterial action of garlic is described. The active principle in it has a marked bacteriostatic action on various organisms both Gram-positive and Gram-negative, and a very feeble bactericidal one.

In high dilutions it stimulates bacterial growth and can be used as an enriching substance for the cultivation of various micro-organisms.

Its therapeutic value is doubtful.

Streptomycin in the Treatment of Influenzal Meningitis

By J. R. BIRMINGHAM *et al.*

(From the *Journal of Pediatrics*, Vol. 29, July 1946, p. 1, as abstracted in the *International Medical Digest*, Vol. 49, October 1946, p. 239)

THE report concerns eight patients ill with *Haemophilus influenzae* type B meningitis who were treated with streptomycin either from the start of therapy or following unsuccessful treatment with other therapeutic agents.

At the time the first of these patients was treated (December 1944) there was little prior experience with regard to the clinical use of streptomycin in systemic infections and none with regard to its intrathecal administration, hence the wide variation in the dosage in these patients. In all cases the streptomycin hydrochloride was injected both intramuscularly and intrathecally. The drug was dissolved in normal saline solution in concentrations of 4,000 to 5,000 units per c.c. for intrathecal use, and in concentrations varying between 10,000 and 50,000 units per c.c. for intramuscular use. The intrathecal injections were carried out twice a day, daily or on alternate days whereas intramuscular injections were given every two or three hours.

The sensitivity of the organisms was investigated in most of the cases and several spinal fluid titres were determined. For both types of determination, a crude serial dilution method was used which consisted in adding a standard inoculum of a young broth culture of *H. influenzae* to varying dilutions of either the streptomycin solution or of the spinal fluid to be tested. Control determinations were set up employing, in the earlier cases, a strain of *Eberthella typhi*, later a strain of *Staphylococcus aureus* (Smith).

Since the writers wished to obtain information with regard to the efficacy of streptomycin itself in influenzal

infections, sulfonamides and specific serum were not used simultaneously with the antibiotic. 'Either they were discontinued when streptomycin was started, or their administration was begun when streptomycin therapy was thought ineffectual, or during convalescence, when sulfadiazine was given only after the patient was apparently well of his original infection.' In one case penicillin was used concurrently with streptomycin. In two cases streptomycin was used to the exclusion of all other antibacterial therapy.

'Toxic reactions encountered include: erythema, urticaria, augmentation of meningeal signs, persistence of pleocytosis, local pain on injection, and mild shock on initial administration. None of these was serious.'

In this brief series of patients treated with streptomycin, the writers wish to point out that streptomycin is effective against *H. influenzae in vivo* as well as *in vitro*. 'In four patients the drug was extremely effective; in one it was without effect; one patient was hopelessly ill on admission; one patient showed some response despite inadequate dosage. In view of the rapid sterilization of the blood and spinal fluid in four patients without serious toxic manifestations, streptomycin appears to have a definite, but as yet undetermined, place in the treatment of influenzal meningitis.'

B.C.G. for Britain at last !

By K. NEVILLE IRVINE

(Abstracted from the *Medical Press and Circular*, Vol. 216, 27th November, 1946, p. 406)

It is now forty years since Calmette and Guérin began their search for an inoculation to protect children against tuberculosis. In 1911 they produced the B.C.G. vaccine and started to test it out on laboratory animals: in 1922 Weil Hallé began to vaccinate children in Paris: in 1934 when well over a million children in various parts of the world had been vaccinated, I first advocated its use in this country: in 1946, with the total figure of vaccinated standing at three million, we still remain one of the few countries in which the vaccine is not even obtainable.

At last, however, the tide is turning. A memorandum has been prepared by a Joint Committee of the Tuberculosis Association, the Joint Tuberculosis Council and the National Association for the Prevention of Tuberculosis advocating the introduction of B.C.G. into this country; this has been submitted to the Minister of Health and has been favourably received. We may therefore hope that the production and distribution of this vaccine will shortly be begun in this country. In view of this, I have been asked to give a brief summary of B.C.G. with detailed instruction for its practical use.

A preventive vaccine against tuberculosis has been sought ever since Koch isolated the tubercle bacillus at the end of the last century. Dead vaccines were tried at first, but these proved to be a failure. Next, live vaccines were tried, as in smallpox vaccination; experiments were made with allied forms of the tubercle bacillus, but these either proved too apathogenic to produce any immunity, as in the case of the avian tubercle bacillus, or were so pathogenic as to be dangerous, as in the case of the bovine tubercle bacillus. The only possible exception is the tubercle bacillus isolated from a vole by Wells; work on this is still in its experimental stage but the early results are encouraging.

Following these failures, in 1906 Calmette and Guérin started to attenuate a bovine tubercle bacillus by growing it on special culture media; by 1911 it had lost its virulence for all laboratory animals and succeeded in producing some immunity in them against subsequent tuberculous infection. This was then named B.C.G. (Bacille Calmette Guérin), and extensive work was done in Paris to confirm its harmlessness and effectiveness.

In 1922, Weil Hallé commenced the inoculation of children in Paris without misadventure; the popularity of the vaccine in France increased rapidly, until its

production was finally taken over by the State and it was issued free to all doctors. Simultaneously, research was springing up throughout the world from Tokyo to New York, though England still maintained a conservative attitude.

In 1927, Petroff in America alarmed the world by producing a return of virulence to the B.C.G. by laboratory methods. Following on this came the disaster of Lübeck. In the spring of 1930 a group of 249 children were given the B.C.G. vaccine at Lübeck, in Germany; by the end of the summer 73 had died from tuberculosis which was shown to have originated from the vaccine used. The use of the B.C.G. vaccine was immediately prohibited in Germany and an official inquiry was held into the disaster. Britain congratulated herself on her conservative policy and has refused to have anything to do with B.C.G. vaccination since.

Actually, it was very shortly proved that the Lübeck disaster was not due to the B.C.G. at all; an official inquiry revealed that a virulent culture of human tubercle bacilli had become mixed with the vaccine in the local laboratory, and that the original B.C.G. vaccine received from Paris was not to blame. Kirehenstein who inoculated 100 children in Riga with another portion of the same batch of vaccine had no trouble. Here it should at once be stated that the B.C.G. is by no means a 100 per cent prophylactic; at best it only raises the immunity.

Over 400 autopsies have been carefully carried out on B.C.G. children who died; in no case was there any suggestion that the B.C.G. vaccine was the cause. When one considers that at that time 1,343,000 children had been vaccinated without one sure case of death from B.C.G. infection. One feels that one would indeed be cautious if one still doubted the safety of the vaccine for the normal child. The early investigators discovered that B.C.G. vaccine could turn a tuberculin-negative child into a tuberculin positive; recently this has been used almost universally as a criterion of the effectiveness of vaccination and those children who do not become reactors are usually revaccinated. Of the various tuberculin tests the Mantoux has proved to be the most reliable, and is now generally used whenever possible.

When the vaccine was first employed it was given by mouth as being the simplest method for mass inoculation but it was soon found that only about 20 per cent of the cases became Mantoux positive. Later investigators tried giving the vaccine subcutaneously, and succeeded in raising the Mantoux positive figure to 80-90 per cent; unfortunately, this method gives a large percentage of local cold abscesses. Subcutaneous injection gave about the same number of positive reactors, but also about the same number of abscesses, and this too is now being largely abandoned. The intradermal injection of B.C.G. (with the same technique as the Mantoux) gives a slightly higher figure of reactors and a small local ulcer which may persist for 2 to 3 months; up to the last few years this has been the method of choice. Recently however Rosenthal has devised the 'multi puncture' method whereby forty needles simultaneously stab through a layer of B.C.G. into the skin; this produces a milder local reaction and up to 100 per cent of reactors. Another variation by Nègre and Bretey is to make three crosses with a vaccine stylet through drops of B.C.G., the results of this are also good.

If we assume that a positive Mantoux is essential to prove that an adequate degree of immunity has been achieved, then it is obvious that all the early oral work may be discarded as statistical evidence; only that work which has been done since the introduction of the parenteral methods need be considered. It would be thought that with all the work done there would be a considerable amount of statistical evidence to show the degree of immunity which can be produced by this vaccine. In practice, the difficulties of obtaining exact controls and of adequately following up the inoculated cases over a period of years are enormous, but the work of Heimbeck does give a typical example of the results. Heimbeck found a large proportion of

his pupil nurses became tuberculous within a short time of starting their hospital training. On testing he found that half of them had a negative Pirquet on arrival at hospital. He further found that those who showed an initial positive test had an ultimate morbidity rate from tuberculosis of 2.6 per cent, while those who were negative had a rate of 29.6 per cent. He therefore inoculated most of the negative nurses with B.C.G.; in 1927 the morbidity rate in the B.C.G. group had dropped to 2.3 per cent. It is impossible to draw clear statistical figures for the effectiveness of the B.C.G. from most of the work done, partly because of the incompleteness of the experiments and partly because of the varying conditions; in particular, the conditions under which the vaccinated and the controls live are rarely strictly comparable. One's impression was that B.C.G. at least doubled the natural immunity of the average European or American child.

As regards the B.C.G. itself, this will probably be issued in ampoules. As it is a live vaccine it must be used before it dies, or even before deterioration sets in; the exact date of the commencement of deterioration is still a debatable point, but it is safe to say that, kept in a cool place, it will maintain its full potency for ten days.

In conclusion one would say that the procedure is as simple and safe as smallpox vaccination; the degree of immunity produced is, unfortunately, not nearly so great, but it is sufficient to make one wonder why it has so long been withheld from the British child.

Permeability of the Human Placenta to Isoantibodies

By ALEXANDER S. WEINER, M.D.
and
EVE B. SONN

(Abstracted from the *Journal of Laboratory and Clinical Medicine*, Vol. 31, No. 9, September 1946, p. 1020)

Two cases of erythroblastosis due to A and B sensitization are described. Comparative titrations of the alpha and beta antibodies in the sera from both cases were carried out by the agglutination and conglutination techniques. In the titrations carried out by the agglutination technique, it was found that the ratio of the antibody titres of the maternal and infants' sera was 8 : 1 in case 1 and 64 : 1 in case 2. On the other hand, in tests carried out by the conglutination technique, the ratios of the titres approximated unity. The reason for the discrepancy is that the two tests measure two different sorts of antibodies. The former test detects bivalent antibodies (agglutinins), while the latter test also detects univalent antibodies (glutinins). These results demonstrate, therefore, that glutinins traverse the placenta far more readily than agglutinins, in accordance with the expectations under the hypothesis that the former are comprised of smaller molecules.

It may seem somewhat puzzling that in both cases the univalent beta antibodies were more readily demonstrable in the maternal serum by the conglutination method than were the univalent alpha antibodies. The following plausible explanation for this apparent paradox suggests itself. It would be expected that univalent antibodies in general would continue to pass through the placenta from mother to foetus until their concentration in the foetal circulation became equal to that in the maternal circulation, thus setting up an equilibrium. In the case of beta antibodies, such an equilibrium could be reached quickly, but in the case of the alpha antibodies, the antibodies would be neutralized or absorbed by group substances in the group A foetus' body, delaying the attainment of equilibrium and at the same time gradually depleting the mother's body of the alpha antibodies.

The fact that in both cases described in this paper first-born infants were erythroblastotic calls for some comment. In the first case, the patient stated that

two years previously she had had an ovarian tumour removed and was given several post-operative transfusions of commercial, pooled human plasma. With regard to the second case, the source of the sensitization could not be traced as definitely. However, it should be pointed out that A-like and B-like antigens are ubiquitous in nature, so that there would be many opportunities for A-B sensitization to occur in the course of a lifetime. For example, such antigens are present in horse serum and pig pepsin, so that injections of therapeutic horse serum or diphtheria toxin-antitoxin could bring about A-B sensitization. Moreover, such antigens are present in many bacteria and animal parasites, so that certain infections could cause A-B sensitization. The second patient did give a history of a severe attack of pneumonia several years before her first pregnancy, and possibly this was the source of her sensitization.

A. B. R. C.

Lymphocytic Choriomeningitis

By B. R. SREENIVASAN

(Abstracted from the *British Medical Journal*, ii, 19th October, 1946, p. 573)

LYMPHOCYTIC choriomeningitis is a disease that occurs not uncommonly in Singapore, and, unless one is on the look out for it, cases might easily be missed. Headache was complained of in only 4 cases and neck rigidity in but 5 cases out of 8; only 2 had a positive Kernig's sign. One of the cases was simply a pyrexia of unknown origin, and there was no symptom or sign pointing to the central nervous system; this case would certainly have been missed if a lumbar puncture had not been done. It would therefore be advisable to bear this disease in mind when dealing with any obscure case with fever, headache, giddiness, or vomiting. There was no history of a similar illness occurring in the household or intimate contacts of these cases; none of them showed any evidence of infection of the ear, nose, or throat; and there were no sequelae.

The findings may be briefly summarized as follows:

1. Duration of illness: 2 to 21 days (average 7).
2. Race incidence: 5 Indians, 3 Chinese.
3. Age incidence: 19 to 42 years (average 27). It must be recorded here that only adults, as a rule, were admitted to these wards.
4. Number of days in hospital: 11 to 29 (average 19).
5. Fever: present in 6 cases.
6. Headache: present in 4 cases.
7. Giddiness: present in 2 cases.
8. Vomiting: present in 1 case.
9. Weakness of legs: present in 1 case.
10. Mental symptoms: present in 2 cases.
11. Hyperaesthesia: present in 1 case.
12. Neck rigidity: present in 5 cases.
13. Kernig's sign: positive in 2 cases.
14. Cerebrospinal fluid: (a) Cell count varied from 152 to 900 per c.mm. (b) Sugar varied from 10 to 84 mg. per 100 ml. 5 out of the 8 cases were between 45 and 60 mg. per 100 ml. (c) Chlorides varied from 627 to 745 mg. per 100 ml.
15. Cases not treated with sulphanilamide spent an average of 22 days in hospital, whereas those treated with it stayed there for an average of 16 days. From these figures it is impossible to draw any definite conclusion as to the therapeutic value of sulphanilamide, but the clinical impression was that cases seemed to benefit from its use.

A brief account of the literature of lymphocytic choriomeningitis is given, with reference to the clinical picture, aetiology, and pathology of the condition.

As no cases have so far been actually reported in Asiatics, 8 instances of the disease are described.

All the cases were seen at the General Hospital, Singapore. The cases conformed to the characteristics described by Gibbens (1931).

Hens' Eggs and Salmonella Infections

(Abstracted from the *British Medical Journal*, ii, p. 583)

WHILE outbreaks of food poisoning implicating hens' shell-eggs are excessively rare, J. Watt described an outbreak of twenty-eight cases of food poisoning on board a merchant vessel due to *S. montevideo* in hens' eggs eaten in a salad. The strain was isolated from several of the unused shell-eggs. M. Crowe in this country has described a small outbreak of food poisoning very probably caused by a hen's egg. The case against the duck is not only that pathogenic salmonella strains are found but that ducks are liable to infection with these strains, and the organisms are then present in the egg yolk. Certain varieties of duck seem to be especially liable to this infection. So far this chain of evidence seems to be lacking for the hen. The nearest approach to it is contained in an important paper by R. F. Gordon and A. Buxton dealing with the isolation of *S. thompson* from outbreaks of disease in chicks. This strain is a fairly frequent cause of food poisoning in man. The authors isolated it during 1943 and 1944 on forty-four occasions from thirty-one outbreaks in chicks and two in ducklings. This organism was isolated from the intestinal tract of two adult fowls but not apparently from the interior of any eggs.

Many more investigations are necessary before any final opinion can be given, but the present position seems to indicate that fowls can harbour salmonella strains which are potentially pathogenic to man. There is no evidence, however, that specific infections with these strains can infect the egg yolk, as in duck's eggs. Their presence in hen excreta explains how in dried egg mixtures it is possible to find pathogenic salmonella strains. The method of preparation of dried egg powder, if inadequately supervised, may facilitate infection. The health hazard from individual hens' eggs seems to be negligible, while that from dried egg powder is much more considerable. Investigations have shown that the drying during manufacture reduces the risk very much but does not eliminate it entirely, and there is always the possibility of infection after drying. A high standard of cleanliness and care in the factory is necessary, as are measures to exclude unsound eggs. A good deal is being done in this direction.

The Sanitary Control of Ice-cream

(From the *British Medical Journal*, ii, 19th October, 1946, p. 584)

THAT freezing kills bacteria is a fairly common misconception. Actually there is no better method of preserving their life for long periods: this is true at least of all those which enter the body by the alimentary route. Ice-cream will therefore contain in the living state the original flora of its ingredients, which may include pathogens if any cream or milk enters into its composition, and—which is more important—those introduced by insanitary methods of handling. Outbreaks of intestinal infection conveyed by ice-cream have been numerous, and regulations have been in existence for some years requiring the registration and inspection of premises used for the preparation of ice-cream. Unfortunately the resumption of its manufacture after the end of the war has been followed by an extensive outbreak of typhoid fever at Aberystwyth due to the contamination of his product by a vendor who is a urinary typhoid carrier. A similar incident has recently been followed by an equally extensive outbreak of paratyphoid B at Coatbridge in Lanarkshire. In view of these occurrences it was evident that further statutory precautions were required, and the Minister of Health has now issued a Draft Order [Draft, dated 8th October, 1946, of the Ice-cream (Heat Treatment) Regulations, 1946], the effect of which, in short, is that the mixture of which ice-cream is composed must be pasteurized before freezing. It may be heated either to 150°F. (65.5°C.) for 30 minutes or to 160°F. (71.1°C.) for 10 minutes. Further regulations

govern the subsequent cooling process and the maintenance of a sufficiently low temperature thereafter. These requirements do not apply when a 'complete cold mix powder' is used, supplied in air-tight containers and manufactured from previously heat-treated material: this may be made up with 'wholesome drinking-water', and colouring or flavouring materials, fruit, nuts, or chocolate, may be added without subsequent pasteurization. In a Circular (183/46) of the same date the Ministry of Health calls attention to these draft regulations and points out that local authorities have already considerable powers in connection with the manufacture and sale of ice-cream under the Food and Drugs Act, 1938, and refers to the possibility of defining bacteriological standards to which the product shall conform. Although it has been represented to the Ministry that laboratory tests of cleanliness are desirable the conclusion reached is that 'no test has yet been devised of the safety of ice-cream, and there is no known test which would be sufficiently reliable for use as a statutory test of its contamination with non-pathogenic organisms'. In the present state of knowledge of this subject it might well be premature to define statutory tests, but a very good idea of the hygienic quality of ice-cream can be obtained by performing a total bacterial count, a coliform count, and the identification of the coliforms as of excremental type or otherwise. The performance of some such tests on the future heat-treated product may also indicate whether the new regulations afford an adequate safeguard. The neglect of elementary precautions in handling and in ensuring the cleanliness of utensils may still presumably lead to serious contamination, if only on a reduced scale.

The 'Doctor' Sign on Cars

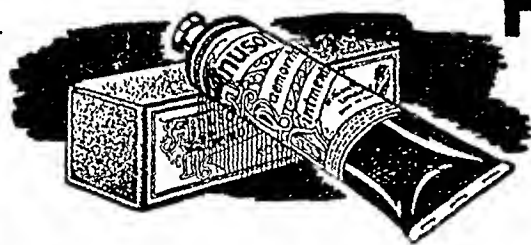
(From the *British Medical Journal*, ii, 19th October, 1946, Supplement, p. 101)

THE retention of the 'Doctor' sign on a good many cars has led to quite heated discussions in some quarters. The sign was introduced originally for use in extreme national emergency, but its display now would be hard to justify in many cases. It is not uncommon to find the sign on many cars parked outside a hall where the local doctors are holding a meeting and it has been seen outside social clubs where the doctor was certainly not attending in a professional capacity. No doubt some case could be made out for its retention because many journeys of the doctor's car are as urgent as those of the ambulance, which carries its own designation. At the same time the use of the sign on ordinary occasions suggests a priority which may be resented by other road users on important business and is not desired by a very large number of doctors. The Executive Committee of the Stratford Division of the B.M.A. has passed a resolution condemning the continued use of the sign and asking the Council to take some action which would discourage it.

The Life and Death of the Red Blood Corpuscle

(Abstracted from the discussion on the above subject reported in the *Proceedings of the Royal Society of Medicine*, Vol. 39, No. 11, September 1946, p. 755)

SHEILA T. CALLENDER referred to their recent work on the life of the red cell. This work was concerned with an attempt to establish a norm for the Ashby technique by the process of bleeding and immediate transfusion of healthy volunteers. The subjects were 6 male medical students and 4 women working in the department. They all belonged to group A or B and were Rh positive. Two of the men were excluded from the final results, one because he developed a small pleural effusion, presumably tuberculous, and the other because he had a transfusion reaction due to the use of a 'dangerous universal donor'. It was found



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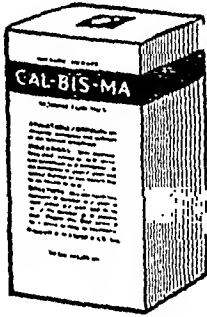
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consistently that the average life of the transfused red cells is about sixty days and that the rate of destruction is 0.83 per cent of the initial amount per day. The average life after transfusion is thus half the normal, since the transfused cells are of all ages and have already lived 60 days on the average.

Dr. J. F. Loutit discussed the survival or transfused normal red cells in recipients with hypochromic anaemia, Addisonian anaemia and acholuric jaundice, both congenital and acquired; also the survival of red cells transfused from donors with Addisonian anaemia and acholuric jaundice to normal recipients. In 1944 Brown, Hayward, Powell and Witts studied, by the Ashby technique, the survival of transfused normal red cells in 6 cases of idiopathic hypochromic anaemia. Their results showed a nearly constant rate of destruction with an average life of the transfused red cell of just over 50 days. Ashby in 1921 followed the survival of transfused group O red cells in 4 group A recipients with pernicious anaemia. In two of the cases elimination of the transfused red cells appeared to be complete by the 91st and 100th day respectively. In the other two, elimination was not quite complete at the 83rd and 100th day. Wearn, Warren and Ames repeated the experiment in 4 recipients with pernicious anaemia in 1922 and found that the transfused red cells survived for 59 to 113 days. The results of Ashby and Wearn *et al.* were obtained before the institution of liver treatment. In 1944 Brown *et al.* noted one case of true Addisonian anaemia responding to liver and showed that the survival of the transfused red cells was of the normal linear type. Dr. Loutit himself had the opportunity of transfusing with blood stored in acid citrate-glucose solution 5 cases of true Addisonian anaemia responding to liver and following the survival of the transfused red cells. These cases showed a 50 per cent survival of the transfused red cells at an average of 40.5 days. This is rather less than the corresponding figure of 60 days obtained by Mollison and Young for blood 0 to 4 days old in 15 recipients with hypochromic anaemia. Dr. Loutit's conception was that the red cells of pernicious anaemia cases are discharged from the marrow with faulty protoplasm, due to the liver principle deficiency, and being faulty are as unduly susceptible to destruction in the circulation of pernicious anaemia cases as in a normal person. The survival of red cells from 4 cases of acquired acholuric jaundice was substantially normal, 50 per cent survival being greater than 50 days in all 4 cases.

A Case of Addison's Disease Successfully Treated by a Graft

By L. R. BROSTER

and

H. GARDINER-HILL

(Abstracted from the *British Medical Journal*, ii, 19th October, 1946, p. 570)

AN account of a girl with Addison's disease is given. The grafting into this patient of a hypertrophied adrenal gland derived from a woman suffering from the adreno-genital syndrome (hyperplasia) is described.

The diagnosis of Addison's disease in this girl was based on the classic clinical-picture-typical asthenia, pigmentation, gastro-intestinal symptoms, and low blood pressure. When she originally came under Dr. Wetherell's observation for this condition her blood sodium was 310 mg. per 100 ml.; six months later it had fallen to 284 mg. per 100 ml. When she came under our observation three months later she was taking extra salt and was on substitution therapy; an initial sodium withdrawal test for a week resulted in her blood sodium falling to 295 mg. per 100 ml., and her blood pressure to 95 systolic. We considered that the diagnosis of Addison's disease was established.

The patient's condition changed satisfactorily after operation, and in our opinion, as a result of it. Sodium

withdrawal tests carried out for a week at a time at intervals as above stated showed that she no longer reacted to withdrawal of extra salt by a fall in blood sodium or a fall in blood pressure. In fact, in the first two sodium withdrawal tests in May and October, four and nine months after the operation, the blood sodium rose rather than fell at the end of the week's extra salt withdrawn, while the blood pressure remained at about the same level. In the final test, just over a year after operation, the blood sodium remained at a steady level after extra salt withdrawal, and the blood pressure was slightly higher at the end of this week's test. The results of these tests were obviously entirely different from the results of the tests before operation, and we felt it reasonable to assume that the cortical deficiency had been corrected. This was confirmed by the fact that following the final test the patient was able to leave off extra salt and carry on without any treatment at all. The last blood sodium reading, after three weeks of all treatment, was well within the normal limits, while her blood pressure at this time was actually showing readings that had never been recorded before. As a result of what we considered to be emotional reaction when her blood pressure was taken, readings as high as 180 systolic were found.

The results, therefore, of the grafting operation appear to have been extremely satisfactory, and if one can accept the blood sodium levels in similar salt withdrawal tests before and after operation as an indirect indication of the state of the cortical-deficiency sodium leak, it would appear that the latter has been compensated by the adrenal graft. It was unfortunately impossible to get the measure of the leak by urinary sodium and chloride excretion estimations, but it would certainly have been interesting to have noted whether there was any raising of the renal threshold during the tests as an explanation of the high sodium figures noted after the second and third tests.

Further follow-up data will be published in due course, but as it is now over a year from the time of the operation, we are hoping that the improvement will be maintained.

It is to be noted that in spite of the fact that this patient was grafted with an adrenal from a patient with the Addison's disease, there is no evidence of that in her case, and her menstrual cycle remained regular throughout the period of observation following operation. Her 17-ketosteroids were estimated about two months after the operation and found to be within the normal range of 10.3 mg. a day.

Reviews

ORAL MEDICINE—DIAGNOSIS AND TREATMENT.

—By L. W. Burket, D.D.S., M.D. 1946. J. B. Lippincott Company, Philadelphia and London. Pp. xxvii plus 674, with 350 illustrations, 60 in colour on 10 plates. Price, 72s.

THERE is some truth in the author's statement that the importance of the oral cavity as an indicator of the general health of an individual has not been sufficiently appreciated. Too often the physician's examination consists in a cursory glance at the tongue or the tonsils and the dentist's activities are confined to mechanical operations only, yet a careful examination can throw much light on the patient's general condition. In this respect the dentist has a unique opportunity to recognize the earliest signs of many diseases and can co-operate with the physician to the great benefit of the patients, though he need not concern about treatment except in so far as it depends on dental care. This book which is primarily meant for dentists is designed to encourage this sort of co-operation. It discusses the oral aspects of various systemic diseases

and also the remote effects due to infection or other conditions in the mouth. The ætiology, diagnosis and treatment are described in various sections of the book, but we cannot understand why typhus fever, botulism and tetanus have been included under gastro-intestinal diseases. Though practical, the book is a little too comprehensive and in our view those diseases which have doubtful dental implications might have been excluded. There is a chapter on focal infection and many will agree with the author's conclusions. Other chapters deal with laboratory procedures, hazards of dental practice and oral aspects of aviation medicine. The book is profusely illustrated, and there is a coloured atlas of lesions commonly encountered in daily practice, followed by a diagnostic index. Dentists will find it interesting and instructive.

R. N. C.

EDINBURGH POST-GRADUATE LECTURES IN MEDICINE. Volume Three. (1942-43.) Published for the Honyman Gillespie Trust by Oliver and Boyd, Edinburgh. Pp. xi plus 387. Illustrated. Price, 15s.

This volume contains thirty-two lectures delivered in 1942-43 by a team of specialists under a grant from the Trustees of the late Mrs. Honyman Gillespie, the delay in publishing being due to paper shortage. The subjects are varied and cover a wide field, being such as sciatica, cerebro-spinal fever, chemotherapy, cancer, control of sepsis, intestinal obstruction, air-borne infection, diet, delinquency, deafness, etc. The lectures provide a reliable survey of the advances and attainments in the chosen subjects. The price is moderate.

R. N. C.

TUBERCULOSIS AND CHEST DISEASE FOR NURSES.—By G. S. Erwin, M.D. 1946. J. and A. Churchill Limited, London. Pp. vii plus 236. Illustrated. Price, 10s. 6d.

This book on Tuberculosis and Chest diseases is very well written, the different stages being clearly set out and easy for the probationer nurse to follow. Though at the moment there is still no special part in Nursing Council Registers in this country for the tuberculosis trained nurse, the day is fast approaching when there will be, and even now there is, from the study of such a book as this the probationer who is doing General Training can benefit very greatly.

P. B.

ILLUSTRATIONS OF ANATOMY FOR NURSES.—By E. B. Jamieson, M.D. Second Edition. 1946. E. and S. Livingstone, Limited, Edinburgh. Pp. 64 plus 8 Index pages. Price, 8s. 6d.; postage, 6d. (home)

This collection of anatomical illustrations is really wonderful; any nurse lucky enough to possess it will find it invaluable in learning her lectures. It is beautifully produced and very handy. It should be strongly recommended to nurses in all training schools.

P. B.

BACTERIA IN RELATION TO NURSING.—By C. E. Duke, M.D., M.Sc., D.P.H. 1946. H. K. Lewis and Company, Limited, London. Pp. viii plus 186 with 20 illustrations including 12 in colour. Price, 12s. 6d.

An excellent manual of instruction for the nurse who intends to devote her energy towards teaching and useful to the Sister Tutor who has to explain the science of Bacteriology to student nurses. A book to be recommended for the library of all Sister Tutors.

P. B.

AIDS TO TRAY AND TROLLEY SETTING.—By M. Houghton, S.R.N., S.C.M., D.N. (Lond.). Third Edition. 1946. Baillière, Tindall and Cox, London. Pp. xiii plus 210. Illustrated. Price, 5s.

A VERY useful pocket book for any nurse or general probationer. The description of the various Tray and

Trolley sets is clear and concise, and a nurse ordered to prepare for any of the treatments so described can with the help of this useful manual do so quickly and accurately. The glossary of instruments is particularly useful to the young student nurse. I would recommend this book to all nurses.

P. B.

PATIENTS AND APPENDICITIS.—By Sir Crisp English, K.C.M.G., F.R.C.S. 1946. J. and A. Churchill Limited, London. Pp. vii plus 155, with 4 figures on 2 plates. Price, 10s. 6d.

This compact little book, written essentially to give the general practitioner the outlook of the surgeon on appendicitis, certainly achieves its objective.

Within the compass of twelve very readable chapters a complete survey of the subject is made and a surprising amount of detail included.

Beginning with a delightful essay on patients, which no doctor or surgeon in active practice can afford to miss, the standard thus set is steadily maintained. The size of the book calls for dogmatism found in places but without detracting from the usefulness of the whole.

The plea for wider education of the general public in matters of the Acute Abdomen is urgent and one that should receive the attention of all Public Health Departments.

There are references to caecostomy for distension and drainage for fourth and fifth day appendicitis cases which are dangerous in the reviewer's opinion, especially since their exact indications are nowhere mentioned. The use of a Miller-Abbott Tube and penicillin, sulphate treatment receives no mention.

Although the importance of charting the pulse and temperature is mentioned, that of a fluid intake-output chart is neglected.

The opinion that operation is the best hope for the general peritonitis patient will not be welcomed by all surgeons and with good reason. The choice is not one of operation or no operation, but is rather a problem of planning proper, vigorous, non-operative, treatment and of knowing when an operation is required if at all, taking the evolution of the case with consideration.

The remarks on Anæsthesia in Children are of great importance. The terror a child suffers from having anæsthesia induced whilst fully conscious is horrible, as anyone who as a child has undergone such a crude assault knows. Yet daily the atrocity is committed without a thought.

Advice on the management of the appendix mass should be accepted with much reservation in the tropics or any country where amœbiasis and tuberculosis are common.

It is a pity more attention has not been given to the bibliography. Many of the references are incomplete, and no particular method of quoting has been adhered to.

The book undoubtedly represents a summary of Sir Crisp English's personal practice in appendicitis, and, although each surgeon will develop his own practice as he becomes experienced, the book is full of wisdom derived from a long experience as a surgeon and is worthy of the attention of all general practitioners and young surgeons.

A. T. A.

RARE DISEASES AND SOME DEBATABLE SUBJECTS.—By F. Parkes Weber, M.D., F.R.C.P. 1946. Staples Press Limited, John Bale Medical Publications Ltd., Cavendish Place, London, W.1. Pp. 174

This book is meant for the mature medical man of the leisured class. He will, with its aid, revise retrospectively, the diagnosis of some of his cases.

Many rare syndromes and conditions including Ehlers-Danlos syndrome (over-elasticity of skin + over-extensibility of joints + skin-friability), Sjogren's syndrome (dryness of eyes, nose, throat and larynx),

Maccucci's syndrome (dyschondroplasia + vascular hamartomata) and Luteum Bacher's syndrome (congenital mitral stenosis + defect in inter-auricular septum; appearance suggestive of infantilism, progress good), for instance, are described.

Additional information is supplied on several well-known items such as flushing, blushing, and metabolic and endocrinal disorders.

Freud's influence (he explored dark caves and vaults of the subconscious mind, giant-wise and because of the darkness 'saw' what was not really there), euthanasia (actual pains of disease and dying have been over-estimated, and euthanasia if made legal would seldom be earnestly demanded), queer currency and latest epigrams are not omitted.

The general get-up could be better and it is hoped would be better in the next edition (slightly shorter line, wider margin and better binding).

S. D. S. G.

MEDICAL EMERGENCIES.—By Charles Newman, M.D. (Cantab.), F.R.C.P. (Lond.). Third Edition. 1946. J. and A. Churchill Limited, 104, Gloucester Place, Portman Square, London. Pp. 117

This is the third edition of a useful little book. Brief but pertinent information is given on all points connected with emergencies, with a view to enabling a general practitioner to make up his mind quickly in the face of danger.

The items discussed include poisons, newer drugs, venesection, blood transfusion, administration of opium in abdominal pain and even tracheotomy.

A medical man in general practice cannot fail to find the book useful. Blood transfusion, perhaps, he had better leave to others.

S. D. S. G.

BOOKS RECEIVED

1. Annual Report on the Working of Hospitals and Dispensaries in the Punjab for the Year 1945. Printed by the Superintendent, Government Printing, Punjab, Lahore. Pp. 201. Price, As. 12 only.

2. Nutrition. Bulletin No. 25, January 1947. Published by the Department of Food, Government of India, New Delhi. Pp. 33. Illustrated. Available from the Food Rationing Adviser to the Government of India, Department of Food, New Delhi.

Abstracts from Reports

ADMINISTRATION REPORT OF THE K. E. M. HOSPITAL AND G. S. M. COLLEGE FOR THE YEAR, 1945-46

Hospital.—The average daily in-patients exceeded the accommodation (510 beds), and sometimes the number was well over six hundred. The out-patients also increased both in total and average attendance. The expenditure has been steadily increasing during the last three years, especially on account of in-patients, each of whom costing Rs. 4-13-0 a day during the year under review. This does not include the cost of expensive drugs, injections, blood transfusions, etc., which were met out of the Poor Box Charity Fund amounting to Rs. 38,648. Among the pleasing features of the institution are the Nurses' Welfare Fund and the Co-operative Credit Society of the labour staff.

College.—Eighty-six fresh admissions were made, their average age being 19. It is interesting to note the occupation of their parents or guardians: 26 were dependent on 'service', 16 on business, 12 on medical profession, 4 on legal profession, 6 on pension, 3 on landed property and 19 on miscellaneous occupation. The total undergraduates were 519 including 123 female

students. According to a scheme inaugurated by the Bombay University, they were medically examined and placed in the following classes—577 in A, 42 in B and 11 in C. In the final M.B., B.S. examination the percentage of success was a little over 33. Special post-graduate classes were held, and the number of post-graduates including research students were 69. The college has been recognized for the D.L.O. and D.V.D. diplomas of the University. The report gives a list of various investigations that are going in the hospital and the college and also a list of articles published by the staff in the medical press.

R. N. C.

ANNUAL REPORT OF THE DIRECTOR OF THE PASTEUR INSTITUTE OF SOUTHERN INDIA, COONOR, TOGETHER WITH THE THIRTY-NINTH ANNUAL REPORT OF THE CENTRAL COMMITTEE OF THE PASTEUR INSTITUTE ASSOCIATION FOR THE YEAR, 1945-46

ROUTINE WORK

Antirabic Treatment

(i) Antirabic Treatment for Human Patients

DURING the year under review 18,964 courses of antirabic vaccine were issued under the revised system of treatment. Details of the revised system of treatment are given below:—

	Adult dosage	Child dosage	Number of days
Class I	2 c.c.	2 c.c.	7
Class II	5 c.c.	5 c.c.	14
Class III	10 c.c.	5 c.c.	14

Four hundred and eighty-three patients received a complete course of antirabic treatment at the Institute (469 Asiatics and 14 Europeans). Incomplete courses of treatment were also given to 82 patients.

Two deaths were recorded among the 550 patients who received complete or incomplete courses of treatment giving a mortality rate of 0.36 per cent. The deaths occurred among Asiatic patients.

At subsidiary centres 13,873 received a complete course of treatment and 3,474 were incompletely treated.

Twenty-one deaths were recorded among these 17,347 patients giving a mortality rate of 0.12 per cent.

No case of post-treatment paralysis ('paralytic accident') was reported during the year.

(ii) Antirabic Treatment for Animals

Antirabic treatment was also made available for the prophylactic treatment of animals. During the year 159,040 c.c. of 5 per cent carbolized sheep-brain vaccine were issued for the treatment of animals, and issued chiefly to veterinary officers of the Madras Presidency and the neighbouring Indian States. The number of animals treated during the year was 1,433, of which 965 were dogs.

General Laboratory Work

Routine laboratory examinations were carried out on a large scale for the benefit of hospitals, dispensaries and practitioners. The total number of examinations carried out during the year was 4,427. Most of this was done free of charge.

The Institute also continued to receive and report upon brains from suspectedly rabid animals. During 1945, 404 such specimens were received.

Blood Bank

The Blood Bank work at the Institute was continued. During the year 15,830 c.c. of plasma were prepared. Since the inception of the Blood Bank in 1942 a total

of 77,320 c.c. of plasma have been prepared and issued to various civil, military and mission hospitals.

relationship between the body weight and hæmoglobin is shown below :—

Weight in lb.	71-80	81-90	91-100	101-110	111-120	121-130	131 and over
Mean hæmoglobin in gm. per cent.	10.49	11.71	11.29	12.61	13.29	13.41	14.93

RESEARCH WORK Pasteur Institute

(i) Rabies

(a) *Studies on the cultivation of the ætiological agent of rabies in vitro and its nature.*

Rabies.—Rabies virus can be cultivated *in vitro* in a cell-free medium containing 1.5 per cent steamed sheep-brain extract, 2 per cent sheep serum, 2.5 per cent glycerine and 0.15 per cent peptone. This shows that it is not a virus in the accepted sense of the term.

(b) *Studies on antirabic immunization with culture vaccine.*

A method is described for the preparation of a culture vaccine for immunization against rabies.

(ii) Action of Heparin on Snake Venom

Heparin and snake venom.—In view of the antagonism of action of heparin and Russell's viper (daboia) venom on coagulation of blood *in vitro*, studies were undertaken to determine whether heparin would be of any therapeutic value in cases of bite by Russell's viper. *In vivo* experiments, in which heparin was given to rabbits intravenously, before venom was injected i/v or i/m, confirmed that (1) the action of heparin was as effective *in vivo* as *in vitro*, 10 mg. of venom representing over 60 lethal doses having failed to cause death in a rabbit given 5 mg. of heparin i/v, (2) heparin could be given i/v to rabbits without any untoward effect in doses up to 20 mg. per kilo, and (3) animals given lethal doses of venom i/m and subsequently treated by heparin could be saved. These findings seem to justify the therapeutic trial of heparin in cases of bite by Russell's viper, though the optimum dosage and methods of administration in human cases have to be worked out.

The action of heparin on other snake venoms, particularly of the Viperidæ family, was studied. It was found that the venoms of some vipers as *B. arietans*, *B. alternatus* and *Causus rhombecatus* are anticoagulant in their action on blood. Heparin has no action on these venoms *in vitro* or *in vivo*. The venom of *Echis carinatus* was found to be a powerful coagulant. Heparin prevented this action of *Echis* venom to some extent, both *in vivo* and *in vitro*; but it had to be used in very large quantities, approximately 75 times the weight of *Echis* venom used, unlike its action on daboia venom, which heparin could effectively neutralize, weight for weight. It could save animals only up to 20 M. L. D. of *Echis* venom injected; beyond this limit heparin was ineffective.

The venom of the Australian tiger snake (*Notechis scutatus*), though a powerful blood coagulant, was found to contain other factors, e.g. neurotoxic and cytolytic fractions. While heparin could prevent the coagulant action of this venom, it had no effect on the neurotoxic principle and hence could not save animals against more than one or two lethal doses of this venom.

Further studies revealed that heparin has no action on cobra venom and diphtheria and tetanus toxins.

(iii) Studies on Blood

Hæmatological data.—In the course of an investigation on the immunological changes produced in patients as a result of antirabic treatment, it was decided to utilize the specimens of blood collected for a hæmatological survey in addition.

Analysis of the data with a view to correlation of the hæmoglobin levels with any other factor revealed a

Further studies on (a) hæmatological standards in South India and (b) coagulation of blood are in progress.

NUTRITION RESEARCH LABORATORIES

(Indian Research Fund Association)

The analysis of foodstuffs.—The thiamin and nicotinic acid content of different samples of yeast, yeast extracts, wheat, rice, vitamin tablets and ampoules and Prosopis has been determined.

The report on soya bean has been completed and sent to the office of the I.R.F.A. for publication.

The fractionation of the nitrogen and phosphorus complex of the coconut kernel has been completed. The carbohydrate complex of the kernel is being studied.

Experiments are in progress on the loss in vitamin A content of ghee when stored under different conditions. Various animal experiments are being carried out.

Clinical and field investigations.—The work on infantile beri-beri in Cocanada has proceeded and a report on this enquiry is under preparation. While the curative effect of pure vitamin B₁ on infants suffering from beri-beri has been abundantly confirmed, a preventive experiment in which vitamin B₁ tablets supplying one milligram of vitamin B₁ were given daily to expectant and nursing mothers was not wholly successful.

An investigation on lathyrism in Bhopal State was carried out in February 1945. A paper has been prepared on this subject for submission to *I.J.M.R.*, and the attention of the Food Department has been drawn to certain aspects of the outbreak in question, and in particular to the fact that wheat procurement operations played a part in the genesis of the epidemic. The outbreak was due to the consumption of lathyrus as a staple food for six months or more, and no confirmation was obtained of the theory that a poison in the pulse *Vicia sativa* may be concerned in the causation of lathyrism.

Work on the relation between dental caries, fluorosis and nutrition was continued.

Nutrition class.—A course of lectures on nutrition was delivered to 26 officers selected by the Department of Food, Government of India.

SOUTHERN INDIA BRANCH OF THE MALARIA INSTITUTE OF INDIA (1944)

Research activities were mainly concerned with the bionomics of *A. fluviatilis*.

R. N. C.

The Indian Medical Gazette Fifty Years Ago

LONDON LETTER

(Reproduced from the *Indian Medical Gazette*, 1897, Vol. XXXII, p. 107)

THE excessive and increasing prevalence of venereal diseases in the European army located in India is

exciting much attention at the present time. It is recognized that not only are these diseases a serious cause of disablement and inefficiency in the army, but that they are also a veritable and grave cause of degradation of the constitution and health of a substantial and growing proportion of the civil population of Great Britain. The policy of ignoring prostitution and its effects and taking no thought or action to prevent this class of preventable maladies is becoming discredited, and the Press, medical and lay, is beginning to clamour for prompt and effective repressive measures. A very strong and cogent article has been extensively and approvingly quoted from the *Allahabad Pioneer* in which the necessity of interference is clearly proved. It is whispered that this view has been pressed on the government from exalted quarters, and a strong committee, under Lord Onslow, is at present engaged in taking evidence on the subject and paving the way, it is noted, for resolute action. Suppressing prostitution by ignoring it is a vain and foolish expectation, contradicted by all history and now signally disproved by this large and disastrous experiment by which so many lives have been blighted, and the constitutions of so many innocent persons ruined. These maladies no doubt arise from abuse of a natural function, but this fact does not act as a deterrent against vice nor as a means of controlling those instincts and impulses which next to the love of life are undoubtedly the strongest animal motives. If what may be conceded to be the natural punishment of abuse and vice fails to deter, the main, if not the sole, argument in support of the *laissez faire* policy falls to the ground. On the contrary, even from the purely moral point of view, the opposite policy of recognizing and regulating has been proved by experience to have a more deterrent, suppressing and rescuing influence than the others. That most dangerous species of prostitution, the clandestine, is minimized, and many women thus prevented from entering on a career of open dissipation and debauchery, and means are placed at the disposal of the benevolent of bringing salutary influences to bear on those who have entered on a life of vice and of persuading and assisting them to abandon a loathsome and irksome servitude to passion and turn to quiet and useful modes of earning a livelihood. The moral argument when extended is entirely in favour of preventive and repressive measures. Venereal disease is not the only physical consequence of moral ill-doing. Physical evil is largely, if not mainly, the outcome of sin of some sort, yet it has not, on that account, been considered sinful to take thought and effort to prevent and control. No doubt the real remedy consists in going to the fountain head and cleansing the spring; but this cannot be accomplished by folding the hands, standing aloof, and simply watching the operation of cause and effect. Efforts to avert physical evil necessarily imply restriction as regards the causes, and in this particular case, the deprivation of liberty to infect and the restoration to health both include actual suspension, if not abolition, of vice in its most reckless and abominable forms. The principle of prevention is the same as in the case of any other disorder communicable from one human being to another, namely, segregation, as long as infectiveness continues. For the purpose of segregation, notification or detection is necessary. These principles should theoretically apply equally to men and women who become contaminated and dangerous. They are more easily applied to women who make prostitution a profession; but there ought to be no difficulty in the army in dealing with diseased men for the purpose of rendering the spread of disease less easy than it is. That something must be done to prevent the British army from continuing to be a forcing bed of nasty complaints seems quite certain, and the sooner the better.

The examinations for the Army Medical Staff and Indian Medical Service are in progress. Forty-one candidates have come forward to compete for thirty-five vacancies in the former, and twenty-four for seven vacancies in the latter. It is satisfactory to find that the boycotting of the Army Medical Department seems

to be at an end. Some concessions as regards leave and pay have been made, and others will probably follow in time. Surgeon-Major-General Jamieson in his address at Netley at the close of the last session made some very sensible remarks on agitation for the redress of service grievances. He especially condemned anonymous attacks on the authorities in medical and service journals by medical officers on the active and retired list. Grievances exist in every service, civil and military, and open and constitutional methods exist of representing them. The worst method of attempting to procure relief is setting the backs of the authorities up by intemperate and violent anonymous writings. Concessions forced by such means, if indeed they ever are so obtained, are apt to be meagre, grudgingly given, and easily revoked, while a sore, unpleasant and hostile feeling towards those who descent to the use of masked attack remains. It seems better to give the government credit for a desire to exercise justice and generosity than the reverse. So far as I can learn, the present Secretary of State for War is fully impressed with the value and importance of the medical services of the army, both in peace and war, and most anxious to do all in his power to promote contentment and efficiency—conditions which are very intimately related.

The Bombay plague is being keenly watched in Europe, and a sort of panic has arisen among the nations for fear of an extension westward. An important conference is to assemble at Venice on the 16th of this month for the purpose of discussing defensive measures. Meantime resort is being made at many ports to quarantine and prevention of unloading Indian goods. I see that an authoritative declaration has been made in India that plague is not contagious. No doubt this is quite true in the restricted meaning of the word; but that the disease is communicable from man to man and community to community and portable by human agency cannot be denied; no good can come of absolute denial such as I have referred to, nor can resort to precautionary methods of averting the spread of plague be condemned. The only question really is, what methods are best. The choice lies between the discredited and antiquated system of quarantine which is favoured by European powers, and the English system of early and exact information, thorough inspection, isolation of the infected and subsequent watching of the rest—as was recently so successfully put in practice in the case of the *Nubia*.

12th February, 1897.

PRECAUTIONS AGAINST PLAGUE

(Reproduced from the *Indian Medical Gazette*, 1897, Vol. XXXII, p. 101)

NOTWITHSTANDING the efforts that have been made by the authorities on the western side of India, the epidemic of plague has continued to spread in different directions, and wherever the disease has taken root, it shows no signs of abatement in virulence. There can be no doubt that Bombay was taken by surprise, and, when it was realized that plague had invaded the city, the desire not to damage the many interests involved, and the mistaken notion that it was a disease of locality and unlikely to spread prevented the authorities, local and imperial, from taking those radical measures which alone could be relied upon to stamp out and check the commencing epidemic. It is gratifying to record that there was one exception amongst those in authority who took a broad and statesmanlike view of the situation and at once advocated measures which, had they been agreed to and carried out, would in all probability have limited the extent of the epidemic. We refer to Sir Alexander Mackenzie, the Lieutenant-Governor of Bengal. His recommendations were made early in October last and recently repeated in his very able speech in Council. And it must be a source of satisfaction to him to

find that his recommendations, though tardily accepted, are gradually being introduced.

The gravity of the situation is now beginning to be understood even by the most sceptical; and public alarm has emphasized the necessity for action, and not a moment too soon. The danger is not a local one, and the first consideration of government should be to protect the unaffected parts of India; for, should the disease succeed in becoming generalized throughout India, it will not only ruin this country but give such an impetus to the epidemic as to render it a danger to every country in communication with the East. The measures recently taken, though excellent in themselves are hardly, we think, commensurate with the present needs of the situation. The medical inspection of railways, the prohibition of pilgrims from infected areas, quarantine of ships from infected ports, the prevention of the importation by sea of rags, used gunny bags, etc., and the adoption of the policy of segregation camps, are all measures in the right direction, the most important of which we have insisted upon since the disease appeared in Bombay. The passing of the Epidemic Diseases Act gives full power for the carrying out of any measure which may be considered necessary. The time has more than arrived for further stringent precautions, and the government and local authorities ought to be in advance of public opinion in these matters. No necessity should arise for an agitation such as occurred in Madras and Calcutta on the pilgrim question. It is a dangerous policy from every point of view to delay effective action until it is actually forced upon the authorities by outside opinion.

Apart from the dangers to which a district or town within a few days' journey from an infected area is subject from omission of the most stringent measures possible to prevent the introduction of the disease, there is the danger of loss of trade by the action of Foreign Governments who are likely to treat India as one infected centre. Unless, then, the infected areas in India are thoroughly isolated and rigorous measures are taken by the authorities to prevent the extension of the disease into those parts of the country which are marked out as uninfected, it is to be feared that a heavy blow will be dealt to the country at large, and Indian ports quite free of infection will be quarantined. This action on the part of Foreign Governments is no doubt unwarrantable, but it is one which must be considered and dealt with. This is no mere supposition. Dr. Brouardel, the sanitary adviser to the French Government, who has much influence in International Councils, has expressed his views very strongly on the subject. It is for the Indian authorities to disarm criticism by showing that the infected area, which is still extremely small, is cut off by a rigid system of land quarantine including the disinfection and prohibition of certain goods suspected of carrying infection from infected areas. With this done there can be no reason for placing under quarantine any Indian port, except Bombay and Karachi. No doubt, the carrying out of these measures will cost money and give trouble; but whatever it may cost, and whatever trouble it may give, they are insignificant when compared with the loss which would be incurred if Indian ports were placed under stringent quarantine rules by Europe.

Correspondence

HELMINTHAGOGUES

Sir,—Ref. Dr. Rai's article in your *I.M.G.* of October 1946, p. 447, about sulphapyridine and sulphathiazole as helminthagogues, I think that some other drugs also have a similar action.

When treating an enteric case with mist chlorine some years ago, the patient, a boy of 12 years, passed

a number of roundworms on the 2nd or 3rd day of the chlorine treatment. I then started prescribing this mixture as a routine in hospitals and dispensaries for worm cases, as santonin was so scarce and costly.

I had occasion to mention this to other doctors and they also resorted to this line of treatment in their dispensaries. I was surprised to hear from one of them that in a case of tapeworm it also expelled the entire worm. I did not know it could do this, though thread worms used to be expelled.

In case of malaria and *ascaris lumbricoides* in children, the chlorine mixture with the addition of quinine served a dual purpose.

Yours, etc.,

J. F. HENRIQUES, L.M. & S., F.C.P.S.,
B.M.S. (Retd.),
C.M.O., Rajpipla State.

IS SECOND ATTACK OF DIPHTHERIA POSSIBLE?

Sir,—Regarding above will you please permit me to refer to the following lines from Kolmer?

'One attack of diphtheria does not always confer a lasting immunity, second and even third attacks are not uncommon. This is probably because our body cells respond slowly to stimulation by diphtheria toxin with the production of antitoxin and the ordinary attack of diphtheria is too brief in duration for adequate stimulation of antitoxin production. This is indicated by the fact that several months are required for the production of sufficient amount of antitoxin after the injection of toxin-antitoxin mixture (*Infection Immunity and Biologic Therapy*—3rd Edition, pp. 860).

The incidence of diphtheria is most common in children between the ages 8 months and 8 years. This is because by 8th month the congenital antitoxic immunity conferred by the mother to the child passes off. And between the ages 8 months and 8 years the body cells being too immature. Immunity response in case of an infection cannot possibly ward off the probability of another infection during the period.

Reference is also made in Price, 'The immunity afforded by diphtheria is short-lived, relapses are not uncommon and second attacks also occur' (*A Textbook of Practice of Medicine*, 1933, pp. 104).

Yours, etc.,

H. GHOSH, M.B., D.T.M.

CALCUTTA,

17th February, 1947.

BLOOD DONATION

Sir,—I have read with interest the article on the 'Effect of Blood Donation on Haemopoietic System' by Drs. C. R. Das Gupta and J. B. Chatterjea in the August issue of the *Gazette*. As one who has come across some instances of very frequent blood donations, I welcome the article as a timely warning against such a practice. The suggestion that the interval between any two blood donations should be at least 3 months is perfectly sound and it gives even donors with a tardy haemopoietic regeneration ample time to reach their pre-donation level. This was the rule followed by the London Blood Transfusion Service before the war.

There is now no longer any doubt about the relation of food with blood regeneration. Whipple has produced experimental evidence which shows that proteins are essential for regeneration of haemoglobin and that haemoglobin production in the body can be limited not only by iron restriction but also by restriction of protein intake.

The authors' suggestion that 'the donor should be advised to take adequate animal protein for two to three weeks after each donation of blood' may not be practicable in all donors. Perhaps a more practicable procedure would be to give them a week's course of tablets of ferrous iron as is done in England but caution is necessary to avoid the suggestion to the donors (who are already somewhat reluctant) that blood donation is dangerous in that it requires medicine afterwards.

The suggestion that the donor should always be examined not only clinically but also haematologically before each donation of blood is a counsel of perfection not always capable of being followed by the blood banks. A haemoglobin estimation by a reliable technique can, however, be suggested with greater chance of being followed.

Yours, etc.,

K. S. RANGANATHAN,

Officer on Special Duty (Blood Transfusion),
Office of the Director-General,
Indian Medical Service.

REUNION DINNER

SIR,—Last year a dinner was held in London for psychiatrists who had served in India Command and A.L.F.S.E.A. There were forty present and some were accompanied by their wives. The affair was regarded as a success and it has been decided to repeat it this year.

The dinner will be in the Criterion Restaurant, Piccadilly Circus, London, W.1., on Saturday, 21st June, 1947, at 7-30 or 8 o'clock. Several Indian psychiatrists, members of the I.A.M.C., are temporarily in London; and this letter may catch the eye of others who propose to be in the U.K. during the summer on holiday or for post-graduate work.

I shall send further details to any who ask me. The cost of the meal will be about Rs. 10. It is of course necessary to know numbers ahead of the date.

At the last dinner there were numerous enquiries about our Indian colleagues, but unhappily our information was sparse. I shall be delighted to hear from any of them who cannot be at the dinner and to pass on their news to their friends here.

I am, Yours, etc.,

E. A. BENNET

(previously Consultant in Psychiatry,
India Command).

Any Questions

USE OF D.D.T.

SIR,—Could you kindly let me know through the I.M.G. the reply to the following questions:—

(1) The strength in which the commercial D.D.T. solution may be sprayed as an effective domestic insecticide.

(2) The diluent recommended for the purpose so as not to spoil clothes, books and other household articles.

(3) Quantity of diluted D.D.T. to be used in a spray and its frequency so as to eliminate insects effectively.

(4) Ways and means to get rid of the poisonous effects of D.D.T. when utensils and human body have contacted it.

Yours faithfully,

P. K. GHOSH, M.B. (Cal.).

BABHIVAN,

Dist. GONDA, U. P.,
16th February, 1947.

(1) and (2) 5 per cent solution prepared in crude kerosene oil.

(3) The quantity required will depend on the area to be sprayed. The walls and ceiling should be thoroughly treated with the kerosene mixture but not bedding, clothing or garments.

Frequency: There are no fixed rules as to how frequently the spray should be used. It will depend on its action on the local insects.

(4) D.D.T. in the strength used as a liquid insecticide is non-toxic to animals. Some people show a high degree of sensitiveness of the skin; this, however, is not commonly seen.

Washing with soap and water will remove all traces of the insecticide.

D. R.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL B. K. SHEOREY, Additional Assistant Director-General, Indian Medical Service (Resettlement), is appointed officiating Additional Deputy Director-General, Indian Medical Service (Resettlement), with effect from the 23rd January, 1947, vice Lieutenant-Colonel K. S. Fitch, O.B.E., granted leave.

The Secretary of State for India has sanctioned the reversion to military employment of Major F. C. Leach, of the Central Provinces and Berar, Indian Medical Service Cadre, with effect from the 15th November, 1946.

Major J. H. Gorman is appointed Port Health Officer, Bombay, with effect from the 29th December, 1946.

Major Aminul Haq is appointed as Deputy Assistant Director-General, Indian Medical Service (Records), with effect from the 16th January, 1947.

Captain P. W. Weston has been appointed as Medical Adviser (Pensions), with the status of D. A. D. M. S., Defence Department (Pension Branch). Dated 13th January, 1947.

The services of Captain (Miss) A. F. Hankins, Lady Medical Officer, Port Blair, were replaced at the disposal of the Defence Department, with effect from the 22nd August, 1946.

The services of Captain (Miss) L. J. N. Koehhar were replaced at the disposal of the Defence Department, with effect from the afternoon of the 13th November, 1946.

LEAVE

Lieutenant-Colonel K. S. Fitch, O.B.E., Additional Deputy Director-General, Indian Medical Service (Resettlement), is granted leave on average pay *ex-India* for 6 months under the Key leave scheme, with effect from the 16th January, 1947.

Lieutenant-Colonel M. A. Rahman, I.M.S. (Retd.), Member, Federal Public Service Commission, is granted, preparatory to retirement, leave on leave salary equivalent to full pay for 4 months, with effect from the 1st March, 1947.

Lieutenant-Colonel W. H. Crichton, Director of Public Health, C. P. and Berar, granted war concession leave on average pay from 1st November, 1946, to 16th November, 1946, leave on average pay from 17th November, 1946, to 6th January, 1947, and leave on half-average pay from 7th January, 1947, to 14th April, 1947, *ex-India*.

Major V. Srinivasan, Civil Surgeon, Nagpur, granted leave on average pay from 24th June, 1946, to 17th October, 1946, war concession leave on average pay from 18th October, 1946, to 17th December, 1946, and leave on half-average pay from 18th December, 1946, to 30th June, 1947.

PROMOTION

Lieutenant-Colonel L. K. Ledger, O.B.E., Inspector-General of Civil Hospitals, C. P. and Berar, is promoted to be 'Colonel' with seniority from 1st May, 1940.

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Lieutenant to be Captain

P. B. Johri. Dated 27th May, 1946.

RELINQUISHMENTS

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Major W. G. Aranha. Dated 7th November, 1946.
Ty. Major E. K. P. K. Pillai. Dated 25th November, 1946.

Major I. R. Baziel. Dated 26th November, 1946.
Ty. Major Amarendra Nath Mukherjee. Dated 27th November, 1946.

Major Guruswami Audikesavalu Naidu. Dated 8th December, 1946.

Ty. Major A. H. Vatsyayana. Dated 26th December, 1946.

Major A. H. Akhtar, Medical Adviser (Pensions), D. A. D. M. S. (Pensions Branch), Defence Department, relinquished the appointment. Dated 3rd January, 1947.

The undermentioned officer relinquishes his commission on account of ill health :—

Captain P. N. Swift, dated 17th January, 1946, and is granted the honorary rank of Captain.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captain V. A. Mauskar. Dated 31st March, 1946.
Captain G. M. Diwan. Dated 6th May, 1946.
Captain R. S. Khanna. Dated 27th May, 1946.
Captain M. R. Reddy. Dated 13th August, 1946.
Captain T. V. Rao. Dated 30th September, 1946.
Captain S. B. Ghosh. Dated 16th October, 1946.
Captain S. L. Sawhney. Dated 16th October, 1946.
Captain N. K. Nag. Dated 26th November, 1946.
Captain S. K. Basu. Dated 29th November, 1946.
Captain S. K. H. Uraizy. Dated 2nd December, 1946.
Captain A. Bhattacharya. Dated 5th December, 1946.
Captain S. S. Sidhu. Dated 6th December, 1946.
Captain P. V. Kurian. Dated 7th December, 1946.
Captain C. T. G. K. Tilak. Dated 8th December, 1946.

Captain K. P. B. Menon. Dated 9th December, 1946.
Captain S. K. Mitra. Dated 11th December, 1946.
Captain G. Krishnaswamy. Dated 15th December, 1946.

Captain N. V. Gharpure. Dated 17th December, 1946.

Editorial Notice

VENEREAL DISEASES NUMBER

(Reprinted from November 1946 issue of *I.M.G.*, p. 483)

It is proposed to publish a special number, in October next year, on venereal diseases in India.

Original and special articles on their diagnosis, prevalence, complications and treatment will be welcome.

Contributions will be received up to July 1947 and placed before a special editorial committee.

It has been established gradually during the last 10 years or so that the venereal diseases do not thrive in India. Serious doubts have been cast on the previous estimates according to which 20 per cent of the population not showing any signs of syphilis consisted of latent cases of the disease. Such a state of things in India is impossible for a variety of reasons (*vide* this journal, vol. 81, 1946, nos. 6-7, p. 253). Contributions running counter to the old estimates need not therefore be held back in diffidence any longer.

Venereal diseases other than syphilis and gonorrhoea, some of them of special tropical interest, are very seldom discussed in the current medical literature in India. Recently they have been commented upon in this journal (vol. 81, 1946, no. 9, p. 365).

Publishers' Notice

SCIENTIFIC Articles and Notes of interest to the profession in India are solicited. Contributors of Original Articles are entitled to receive 25 reprints *gratis*; additional reprints can be obtained on payment. No reprints will be supplied unless contributors ask for them at the time of submitting their manuscripts.

The preparation of reprints entails rearranging the type, so that there is often a delay of a month or more, after the publication of the *Gazette*, before the reprints are ready. If reprints are not received within two months of publication of the *Gazette*, contributors should write to the Publishers.

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Original Articles

SOME OBSERVATIONS REGARDING THE TOXICITY OF THIAMIN CHLORIDE AND NICOTINIC ACID

By S. H. ZAIDI, M.D.

(From the Physiological Laboratory, K. G. Medical College, Lucknow)

WHILE working on the heart of *Rana tigrina* by the perfusion method recommended by Burridge (1935), I started with a fairly concentrated solution of pure synthetic thiamin chloride in concentration of one part in 1,000 of Ringer and watched the results. No sooner the drug was perfused than the heart, which had been beating normally so far, was suddenly arrested in diastole and remained as such throughout the period of drug perfusion. It, however, started beating strongly again when the Ringer was reperfused (see figure 1, plate VII).

The thiamin chloride solution was perfused at the arrow marked 10—³ B₁. The heart started slowing down and finally stopped in diastole as shown by the straight line on the tracing paper.

At the arrow 2/5R the perfusion of Ringer was started again. The vigour of each subsequent beats was powerful and the heart looked as if it had been infused with fresh vigour. The transitional inactivity of the heart, obviously enough, was not due to any damage done to the heart tissue, otherwise it would never have revived. The heart, so to say, went into a forced sleep and was neither dead nor damaged. Its energy was conserved instead of having been spent as happens in the case of seeds or the more familiar examples of spore-formation (see figure 2, plate VII).

The thiamin chloride solution was perfused at the arrows marked 10—³ B₁ and Ringer was perfused at the arrows R/10.

In these tracings perfusion of the concentrated solution of the drug thiamin chloride was alternated several times with Ringer R/10. The results are exactly similar to those of figure 1. In this particular case the strength of calcium in Ringer was reduced to one-tenth of the normal, this being an unbalanced Ringer (Burridge, 1935). A comparison of the results of figures 1 and 2 shows that calcium is not a factor in the arrest of the heart in diastole (Zaidi, 1946a).

Concluding remarks

This inactivity has been explained away as being due to acidity and hypertonicity by Boyd and Dingwall (1941), a view which in my opinion is erroneous for two reasons. Firstly, all acids have a damaging effect on the heart tissue as was proved by me by putting a drop of lactic acid in the reservoir of Ringer solution and the heart at once slowed down and was

evidently damaged. This heart could not be revived so easily as was the case with the one in question. This particular acid was selected to set at rest future criticism, if any; as lactic acid is both a weak acid and also a physiological product of bodily metabolism and hence is not foreign to the tissues.

To revive the heart after lactic acid perfusion was a very difficult task. It had to be neutralized with alkalis and treated with adrenaline; even then it only partially recovered. Besides, it showed cooked-meat appearance as described by Burridge (1935). Thus, the argument that the stoppage of the heart was due to acidity and hypertonicity is refuted in the light of what has been said. The concentrated solution of thiamin chloride though acid in reaction is not responsible for the stoppage as is apparent from its comparison with lactic acid. I have strong reasons to maintain that the action of the drug is not due to the acclaimed acidity but is an independent action of the drug itself. This being so, the concentrated solution of thiamin chloride is likely to be toxic to the heart.

So far thiamin chloride enjoyed a relative immunity against toxicity because the clinical use of vitamin B₁ is of very recent origin and besides there had been a worldwide deficiency of this particular vitamin. Deficiency cases are hardly the cases on which toxicity can be reached. The so-called massive doses in beri-beri hardly ever reach the concentration of one part in 1,000, where according to my observation, the toxic symptoms ought to supervene. Besides, if it was possible to push it to that extent in a beri-beri case and the heart were to stop due to high concentration of the drug, this sudden circulatory embarrassment would easily be explained away as being due to lack of vitamin B₁, rather than to the effects of the least suspected 'concentration' of thiamin chloride. The reason is that the literature is awfully poor in the observations on normal cases and abounds in deficiency cases only. When I first made a reference to this finding of mine before the K. G. Medical College Old Boys' Association, nobody present agreed with me that such a thing was possible. To ascribe to vitamin B₁ the rôle of toxicity appeared to be unjustified judging from the trend of opinion expressed then. Being handicapped by the limited supplies due to exigencies of war and also lack of funds it was not possible for me to show the results in animals on a large scale but I maintain that if glucose, a perfectly physiological product, could be toxic, if we exceed the optimum concentration, why not vitamin B₁? Besides, I pointed out to them that vitamin D has been shown to have certain poisonous effects if pushed lavishly and hyper-vitaminosis of vitamin D was an accomplished fact. Same was true for all the known hormones; why should thiamin be an exception? But the fact was hard for them to realize such

was the affection for B₁ at a time when the hospitals were flooded with patients of vitamin B₁ deficiency, both frank beri-beri and subclinical deficiency cases.

Next, I injected relatively large amounts of thiamin chloride in a frog and observed the effect. I took two similar frogs and injected 100 mg. of thiamin chloride in one frog (which henceforth would be referred as 'thiaminized' frog) subcutaneously under the abdominal skin and an equal amount of sterile distilled water into the other (the control). After about half an hour I found that the 'thiaminized' frog spread out its limbs. When turned upside down it did not make an attempt to correct its posture as was happening in the case of the 'control'. The reflexes were diminished to the point of being lost. The frog was left as such and after six hours its reflexes started coming back and gradually it was back to activity again after 8 hours or so (see figure 3, plate VII).

The ampoules supplied to me contained chlorobutanol 5 per cent as preservative and hence I endeavoured to obtain pure crystalline thiamin chloride. I did not succeed in my attempts in India and so I wrote to U.S.A. There too it was not possible to get pure crystalline stuff but Messrs. Eli Lilly and Co., Indianapolis, U.S.A., very kindly supplied me with a complementary sample of their Betalin S No. 395 which is not sent ordinarily to this country. This was solution of thiamin chloride in pure sterilized distilled water. I tried this on a new lot of frogs and I found the results exactly what they were previously. These tests confirmed our views held previously.

Sure (1939) observes that narcotized dogs show bradycardia and respiratory arrhythmia after receiving massive doses of vitamin B₁. Similar observations have also been reported by a good number of workers (Bicknell and Prescott, 1942).

To this account may be added my findings with nicotinic acid (Zaidi, 1946a). There too the concentrated solution was found to have had a toxic effect on the heart of frogs.

From the foregoing observations it is clear that vitamins do have a toxic effect and hypervitaminosis is possible in almost all vitamins. This may serve as a signal to the unwary clinicians, who having been accustomed to treat deficiency cases only, is likely to lose all sense of proportion and push the so-called harmless drugs to the points beyond the saturation limits and do harm. Since vitamins are powerful drugs their damaging properties ought to be as well defined and clear cut as are their recuperative actions.

The action of thiamin chloride on the alimentary system of the frog is again something that should be taken note of. In frog at least their action does not seem to be beneficial.

Schultze-Rhonhof and Paul (1939) have noticed that thiamin chloride has a depressant effect on the small intestine. While working

with the perfusion of heart (a slit in the ventricle's apex short circuits most of the perfusing fluid to bathe the outer wall of the heart allowing only some portion to enter the general circulation) through the aorta, I found certain very marked actions on the alimentary system. After a few hours' perfusion I noticed the tongue became very swollen and protruded, the intestines markedly increased in size, and the stomach became a huge dilated white sac (see figure 4, plate VII).

From this I conclude that thiamin has a detrimental action on the frog's alimentary system, a property which may not be shared by other animals. Nicotinic acid does not produce these effects and they must be held to be peculiar to thiamin.

Summary and Conclusions

1. Large doses of thiamin chloride exert a powerful toxic action on the heart of a frog.
2. Large doses of nicotinic acid have a similar action on the heart of a frog.
3. This injurious action of thiamin chloride is not due to the acidity of the solution but is an independent action of the drug.
4. Thiamin chloride exercises marked toxic effects on the alimentary system of the frog, a property not shared by nicotinic acid.
5. Application of these results to human beings is discussed.

I am deeply indebted to Professor W. Burrige for his sound advice, friendly criticism, and help in preparation of this paper. I am also grateful to Messrs. Eli Lilly and Co., Indianapolis, U.S.A., for the supply of their Betalin S No. 395.

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THE GASTRIC MUCOSA IN TROPICAL MACROCYTIC ANÆMIA

REPORT OF A CASE

By J. C. PATEL, B.Sc., M.D. (Bom.), M.R.C.P. (Lond.), Ph.D. (Lond.)

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FENWICK (1870) was apparently the first to comment on the structural alterations in the

stomach in Addisonian pernicious anæmia: there was thinning and pallor of the wall of the viscus, and microscopically, the secretory tubules were degenerative and atrophic with collections of lymphocytes round them. Cahn and von Mehring (1886) drew attention to the absence of free hydrochloric acid in the gastric juice in Addisonian pernicious anæmia and Faber (1926), studying properly fixed material (Faber and Bloch, 1899), came to the conclusions—(1) that this achylia (= anacidity) was always exogenous in origin, (2) that it was an expression of gastritis 'which is not superficial catarrhal inflammation' but 'a disease of the whole gastric parenchyma in analogy with nephritis and hepatitis' and (3) that achylia may exist without any structural alterations in the gastric mucosa.

The classical work of Castle and his associates (1929, 1930, 1931) demonstrated that Addisonian pernicious anæmia was due to the lack of the intrinsic factor in the gastric juice and established the supreme rôle of the stomach in the pathogenesis of this anæmia. Magnus and Ungley (1938) found that the basic lesion in stomach in Addisonian pernicious anæmia was a non-inflammatory atrophy of all its coats in its upper two-thirds, either due to endocrinal or nutritional deficiency, or possibly congenital in origin. On the other hand, Brown (1934), Jones, Benedict and Hampton (1935) and Meulengracht (1939) believed that, histologically, the atrophic lesion was an expression of diffuse gastritis as originally suggested by Faber (1926). Jacobson (1939) claimed that the most significant lesion in the gastro-intestinal tract in Addisonian pernicious anæmia was the almost complete absence of the argentaffine cells, cells whose normal distribution paralleled the localization of the anti-anæmic principle in the alimentary canal in both man and pig. Fox and Castle (1942) have proved that the site of secretion of the intrinsic factor, as defined by the hæmopoietic activity of the human stomach preparations, corresponded to the site of degenerative processes in the stomach (the fundus and the cardia, but not the pylorus or the duodenum) in Addisonian pernicious anæmia.

The lack of the intrinsic factor of Castle responsible for Addisonian pernicious anæmia, therefore, has an underlying structural basis—an atrophy of the acid-secreting area of the stomach, which is also the site of secretion of the human intrinsic factor. On the other hand, absence of the extrinsic factor(s) in the diet is the prime ætiological factor in tropical macrocytic anæmia(s). In the majority of the cases of the latter, though not in all (Bhende, 1942; Bhende and Patel, 1946), there is no histamine-fast achlorhydria or true anacidity. On *a priori* grounds, in this type of macrocytic anæmia, the stomach should not show structural alterations similar to those of Addisonian pernicious anæmia. Though a few cases, apparently of tropical macrocytic anæmia, have been studied at the

autopsy (Balfour, 1927; Mitra, 1931; Gupta, 1932), there are no recorded observations on the appearance of the gastric mucosa in this variety of macrocytic anæmia. In 'the pernicious anæmia of pregnancy', Callender (1944) found the gastric mucosa normal; there was neither atrophy nor inflammatory change. The report of the study of even a single proven case of tropical macrocytic anæmia would seem to be of some interest.

Case report

(I, 363/39) A Hindu male, aged 55, was admitted to the P. G. Singhanee Hindu Hospital for—(i) vague pains in the epigastrium—duration two years, (ii) general weakness—duration one year, (iii) low irregular fever—duration one year, (iv) pigmentation of the face, hands and feet—duration six months, and (v) vomiting—duration two days. There was nothing to note in the family history. He earned his livelihood as a petty shop-assistant. Nothing significant could be elicited about any illnesses in his childhood. There was no history of any attacks of stomatitis, diarrhœa or malaria. He subsisted on a poor vegetarian diet.

Examination showed a man of average build but poorly nourished. Temperature 97.6°F.; pulse 72; respirations 18. There was pallor of the skin and the mucosæ and brownish pigmentation over the forehead and the dorsum of the hands and feet. There was no œdema of the ankles. The tongue was pale and flabby. The liver and spleen were not palpable; there was no evidence of any free fluid in the peritoneal cavity. The abdomen was not tender in any region. The lungs appeared normal. The heart was normal in size and no hæmic murmur could be heard. The B.P. was 110/70. The nervous system appeared intact; all the extremities showed normal sensations and reflexes. There was no paræsthesia.

Laboratory investigations.—(i) Blood: hæmoglobin 7.3 gm. per 100 c.cm.; erythrocytes 1.56 millions per c.mm.; leucocytes 3,500 per cent; monocytes 2 per cent and lymphocytes 61 per cent; cell volume 18.6 per cent; mean corpuscular volume 124 (Bhende and Patel, 1946); mean corpuscular hæmoglobin 47 micro-micrograms; mean corpuscular hæmoglobin concentration (corrected to cell volume 42 = 100 per cent) 38.3 per cent; colour index (corrected to 14.5 gm. of Hb. = 100 per cent) 1.4; volume index 1.24; saturation index 1.12. The smear showed anisocytosis and poikilocytosis but there were no nucleated red cells or parasites. The van den Bergh reaction was negative both direct and indirect; the icteric index measured 5 units. The Kahn flocculation test was negative. The blood urea was 67.5 mg. per cent.

(ii) *Urine and fæces.*—Beyond a trace of albumin there was no abnormality in the urine. The fæces did not give a positive test for occult blood, and no ova, cysts or parasites could be found.

(iii) *Gastric analysis*.—With the oat meal, the fractional method showed absence of free hydrochloric acid in all the samples and a low total acidity. Two days after the test was repeated using 50 c.cm. of 7 per cent alcohol as the test meal and 0.5 ing. of histamine as the optimum stimulus, this showed the presence of free acid in all the three samples aspirated after the injection.

(iv) *Myelogram*.—The sternal puncture smear preparation gave the following differential count of one thousand nucleated cells:—

		Per cent
A. The leucocyte series:—		
Neutrophils segmented	..	4.50
Neutrophils stab	..	6.50
Neutrophils juvenile	..	1.20
Myelocytes	..	5.60
Premyelocytes	..	1.00
Myeloblasts	..	0.20
Eosinophils	..	0.50
Basophils	..	0.20
Monocytes	..	0.70
Lymphocytes	..	22.20
B. The red cell series:—		
Proerythroblasts	..	3.8
Megaloblasts	..	2.5
Megaloblast hæmoglobinized	..	0.3
Normoblasts	..	50.8

The terminology employed is that of Israels (1939, 1941). Other significant features of the smear were the presence of giant premyelocytes, hypersegmented neutrophils and the absence of any mitotic cells among the red cell series. The peroxidase count of the white cell series showed 22 per cent were peroxidase-positive and 78 per cent were peroxidase-negative.

Radiological investigations showed a funnel-shaped stomach with poor peristalsis and quick emptying. There was no niche or filling defect.

Progress in the wards.—He was diagnosed as a case of tropical macrocytic anaemia and put on an acid-hydrochloric (dilute) mixture with meals and intramuscular injections of Exatrope (Glaxo), crude liver extract, 4 c.cm. daily for fourteen days. No iron was administered. On the 8th day of this treatment, the reticulocyte count was 23.8 per cent and, on the 20th day, the blood count was: hæmoglobin 11.07 gm. per 100 c.cm.; erythrocytes: 2.52 millions per c.mm.; leucocytes: 6,800 per c.mm.; differential count: neutrophils 35.5 per cent; eosinophils 0.5 per cent; monocytes 4.5 per cent; and lymphocytes 59.5 per cent; cell volume 30.5 per cent; mean corpuscular volume 121μ (Bhende and Patel, 1946); mean corpuscular hæmoglobin 35.9 micro-micrograms; mean corpuscular hæmoglobin concentration 29.6 per cent; colour index 1.2; volume index 1.2; saturation index 1.0. He developed oedema of the ankles during the first few days of the treatment but this disappeared quickly. The general condition, by this time, had improved very much and the pigmentation on the forehead had disappeared completely, though it persisted faintly on the hands and the feet. He was discharged after twenty-four days'

hospitalization and asked to attend the out-patient department. Here he was prescribed a good diet and hydrochloric acid dilute mixture. Liver extract was stopped. After about one month on this regime his abdominal discomfort reappeared and he also complained of eructations. Fifteen days later he had an attack of glossitis and contracted bronchitis. He was advised readmission to the wards; this he refused and continued on the acid-mixture alone for three months.

Second admission.—This was about four months after his discharge. At this time he complained of general weakness, loss of appetite and paræsthesia in all the extremities. Examination showed marked brown pigmentation of the forehead and the dorsum of the hands and feet. The tongue was pale and glossy, but only slightly painful. Examination of the lungs showed signs of bronchitis. There was no hæmic murmur in the heart. In the extremities the sensations and reflexes were normal. The blood count showed hæmoglobin 8.13 gm. per 100 c.cm.; erythrocytes 2.0 millions per c.mm. and leucocytes 5,400 per c.mm. Intramuscular crude liver extract therapy in large doses was started immediately, but his condition worsened and he expired on the 10th day of admission.

Autopsy record.—A partial post-mortem examination was performed soon after death: no autodigestion of the stomach was noticed. The significant findings were as follows: The liver was enlarged and pale, but naked eye, no fatty change could be seen. Histologically, the liver cells showed cloudy change; there was no hæmosiderosis. The spleen was normal in size and somewhat pale on the cut surface. Histologically, the capsule appeared thickened, the trabeculae were prominent, and the arterioles showed hyalinization. The lymphoid tissue of the organ was atrophic. There was moderate hyperplasia of the reticulo-endothelial cells of the pulp. No malarial pigment could be detected nor could any hæmosiderin be demonstrated. There was no evidence of hæmopoiesis in the organ. The kidneys were pale, but no fatty change was evident. Histologically, a few of the glomeruli were hyalinized. The tubular epithelium showed the changes of cloudy degeneration. At some places the proximal convoluted tubular epithelium was flattened and the tubular lumina contained an eosinophilic fluid. The blood vessels showed the changes of arteriosclerosis.

The stomach.—Naked eye, the viscus was normal in size. Externally there was nothing to note. On opening no ulceration or growth could be detected. The walls appeared to be normal thickness, the mucosa was pale but the mucosal folds and rugae showed the normal pattern all over. For the histopathological study the organ was stretched and fixed; representative portions from the cardia, the fundus, the body, and the pylorus were sectioned. Only the hæmatoxylin and eosin stains were employed.

The cardia (figure 1, plate VIII).—The surface epithelium was normal. The crypts appeared widened. The glands were less dense than normally, but there was no distortion of the glandular architecture. The lamina propria did not show any increased connective tissue but the cellular content was larger than normal. The cells were mainly lymphocytes with only a few plasma cells. At one place was found a polypoidal hypertrophy of the mucosa and in this the glands showed cystic dilatation. The submucosa was widened and showed small collections of lymphocytes and plasma cells round the capillaries. The rest of the coats were unaltered.

The fundus and the body (figure 2, plate VIII).—The surface epithelium was normal. There was widening and shortening of the crypts. No appreciable diminution in the glandular content could be made out nor was there any irregular branching or tortuosity of the glands. As far as could be judged the two specific types of epithelial cells—the chief or zymogenic cells and the oxyntic or parietal cells—were present in normal numbers but in the necks of the glands the mucous cells were on the increase. The interstitial tissue of the lamina propria was definitely increased mainly due to the large accumulations of lymphocytes and plasma cells. No aggregations into lymphoid follicles could be made out. A few eosinophils could be identified, as also an occasional Russell's body. The submucosa showed the same features as in the region of the cardia. The other coats did not show any changes.

The pylorus (figures 3 and 4, plate VIII).—The surface epithelium was well preserved. The crypts were conspicuously wide. The glandular content compared well with the normal. Only an occasional gland showed distortion and cystic changes. In a single instance, out of the six blocks studied, was detected an islet of typical intestinal epithelium (figure 4). The interstitial tissue was markedly increased and in this both the connective tissue and the inflammatory cells seemed to share. The cells were mainly plasma cells, next came the lymphocytes, and at places they formed focal accumulations. Prominent lymphoid follicles with germinal centres could also be made out here and there. Eosinophils were fewer. Russell's bodies were many more than in the other portions of the stomach. The cellular infiltration was much more at the surface than in the deeper portions of the lamina propria. The submucosa again appeared widened and showed oedema and small accumulations of lymphocytes and plasma cells. The other coats did not show any changes.

Discussion

The patient was emaciated and clinically did not show any signs of cord involvement. The hæmatological studies revealed the presence of a macrocytic normochromic anæmia. The absence of a positive van den Bergh reaction and the presence of free hydrochloric acid in the gastric

juice after histamine stimulation were points against the diagnosis of Addisonian pernicious anæmia. The myelogram, from our experience, was compatible with the diagnosis of tropical macrocytic anæmia. The clinical and laboratory findings put together, therefore, entertained no other diagnosis.

Histologically, the stomach showed the condition of chronic gastritis: a diminution in the parenchymatous elements of the mucosa, fibrosis and presence of chronic inflammatory cellular accumulations in the mucosa and the submucosa. These findings resemble, to some extent, those described for Addisonian pernicious anæmia by Faber (1926), Brown (1934), Jones, Benedict and Hampton (1935) and Meulengracht (1939), though atrophy of the secretory elements was not marked. They are, however, in direct contrast to those of Magnus and Ungley (1938). The local polypoidal condition in our case has also been described in Addisonian pernicious anæmia (Olson and Heck, 1945).

Ætiologically, Addisonian pernicious anæmia and tropical macrocytic anæmia are different, in some ways contrasting entities. Lack of the intrinsic factor is the cause of the former; this is a strong basis for the existence of a specific lesion in the gastric mucosa which actually secretes that factor. On the other hand, the lack of all exogenous extrinsic factor responsible for tropical macrocytic anæmia may not (? need not) produce specific structural alteration in the stomach. Only if the changes of non-inflammatory atrophy of the gastric mucosa described by Magnus and Ungley (1938) be universally accepted as the underlying structural basis responsible for the absence of the intrinsic factor of Castle in Addisonian pernicious anæmia, will the changes described by us for tropical macrocytic anæmia have any meaning at all. It is possible that with the recent discovery of the efficacy of 'folic acid' in the treatment of both these types of anæmias their pathogenesis may have to be reviewed. We need hardly add that, though the opportunities to study cases of tropical macrocytic anæmia at the autopsy will continue to be rare and rarer day by day, it would be folly to draw any conclusions from the study of a single case.

Summary

The changes in the gastric mucosa in a single proven case of tropical macrocytic anæmia are described.

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A STUDY ON CLINICAL VALUE OF THE WIDAL REACTION AND ITS VARIATIONS IN TYPHOID FEVER

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THIS problem formed a part of the research work carried out on 'Study of prolonged pyrexia cases' at Sir H. N. Hospital, Bombay. It is a fact that in general practice most of the cases are diagnosed as typhoid on the strength of Widal reaction alone, and other methods are rarely resorted to. This stresses the value of the Widal reaction in clinical medicine as far as diagnosis and prognosis are concerned. At present we do not know much about the significance of its variations and fluctuations met with during the course of the illness. I do not intend to discuss the serological aspects of this test and factors influencing it, but I will reproduce my findings on this study about its clinical value.

Seventy-five cases of typhoid fever were studied in detail. Clinical, bacteriological, serological and therapeutic study was carried out. Widal reaction, blood, urine and stool cultures and examinations were done once every week throughout the illness. These patients were examined clinically every day. In this paper I intend to present only the findings on 'Widal reaction test' and conclusions drawn from this.

There are many queries arising about this test. Many questions are put by students, undergraduates and post-graduates. Answers to these

questions are not always easy. Some of the queries are as follows:—

1. What titres in Widal test should be considered as absolutely diagnostic for typhoid fever?

2. What modifications occur in titres if a patient is previously inoculated with T.A.B.?

3. Which agglutinin is more diagnostic, 'O' or 'H', and what are their individual significance and value?

4. Do the titres of 'O' and 'H' agglutinins vary or fluctuate in subsequent weeks? If so, do they undergo similar fluctuation or independent of one another? If such variations occur, what is their clinical significance?

5. Are these variations, fluctuations, etc., of any value in forecasting the course of the disease, and prognosis in a patient?

6. Is it possible for the agglutinins not to appear at all in blood, in spite of patient being a proved typhoid case, bacteriologically?

Interpretations of the agglutination test on which we chiefly rely for diagnosis are by no means clearly understood. Many factors influence this reaction but we have no precise idea about them. Some facts gathered from present literature are briefly reviewed here.

Widal reaction becomes positive usually after an illness of 10 days, but 20 per cent of cases may show positive agglutination in the first week. Then the titre gradually rises and agglutinins are found in 90 per cent of cases in the 4th week of illness and persist for some weeks thereafter.

Detection of 'O' agglutinins is a valuable and often necessary step in the diagnosis of enteric infection, but it is of less value in differentiating between one type of enteric infection and another.

Problem of diagnosis in inoculated persons with T.A.B. is often difficult. 'H' agglutinin titres developed due to inoculations are higher than 'O' agglutinin titres and secondly 'H' agglutinins persist longer than 'O' agglutinins. Thus 'O' agglutinins are of more significance than 'H' agglutinins in inoculated persons. In an inoculated person a high 'H' agglutinin titre (1:50 to 1:250) by itself unless rising (from 1:50 to 1:250) is of no significance. No doubt, we will have to consider the possibility of non-specific stimulation of antibody production. This shows that a diagnosis of enteric fever can be based with reasonable safety on a single agglutination test only if a high titre of 'H' agglutinins is found in an uninoculated person or a very high titre in person who is not very recently inoculated or an 'O' titre well above the normal level in the uninoculated or not very recently inoculated person.

In interpreting the results of agglutination titres, one has to consider the stage in disease at which the sample of blood has been taken and the previous inoculation with T.A.B. vaccine. No arbitrary titre can be selected at or above which an agglutination can be regarded as positive in diagnostic sense and below which it can be regarded as negative, but should be

viewed along with other evidences present. In majority of typhoid cases during the third week of illness, 'H' titre goes well above 1:100 and 'O' titre also over 1:100. 'The rise in agglutinins is associated with a decreasing bacteremia and the time at which the agglutinin titres reach maximum coincides approximately with an amelioration in the patient's general condition as indicated by a gradual fall in temperature' (Topley and Wilson, 1944), but this is not always so, as shown in my cases.

'Agglutinins usually appear in blood between 3rd and 7th day of disease, rise first slowly, then more steeply to a maximum between 16th and 22nd day and then fall at first steeply, later very slowly, so that they are detectable for weeks or months after convalescence' (Topley

and Wilson, 1944), but this is also not true in all cases as shown later on in this paper.

A few observations were made on the various types of fluctuations in agglutinin titres during the course of illness. Titres did not always rise uniformly in subsequent weeks and so gave rise to various types of fluctuations. Rise and fall of individual titres of 'O' and 'H' agglutinins also varied widely. Looking at the results, I have divided these cases into two main groups:

(a) Cases in which agglutinin titre goes on rising gradually during acute illness. This is a common finding.

(b) Cases where fluctuations and variations in titres in subsequent weeks are noted.

Thirty-six per cent cases had uniformly usual rise in titres. Mortality in this group was 19

TABLE I

Case illustrations showing variations and fluctuations in 'Widal titre' in subsequent weeks

1 Case number	2 Weeks of illness	3 Titre 'H' dilution (B.T.H.)	4 Titre 'O' dilution (B.T.O.)	5 Para typhosus A	6 Para typhosus B	7 Result	8 REMARKS
1	III	1:125	1:125	1:125	1:125	..	..
	IV	1:50	1:50	1:50	1:50	..	..
	V	Negative	Negative	Negative	1:50	C	Normal temperature.
2	II	1:50	1:50	Negative	Negative	..	..
	III	1:250	1:125	"	"	..	..
	IV	1:50	1:125	"	"	..	..
	V	1:500	1:125	"	"	..	..
	VI	1:500	1:50	"	"	C	Normal temperature.
3	II	1:50	Negative	Negative	Negative	..	..
	III	1:125	1:125	"	"	..	..
	IV	1:250	1:125	"	"	..	..
	V	1:50	1:50	"	"	C	Normal temperature.
4	II	1:250	Negative	1:50	1:50	..	..
	III	1:50	"	Negative	Negative	..	..
	IV	1:125	1:125	"	"	..	..
	V	1:125	1:125	"	"	..	..
	VI	1:50	Negative	"	"	C	Normal temperature.
5	IV	1:250	1:50	Negative	Negative	..	Normal temperature.
	V	1:250	1:500	"	"	..	Blood culture positive
	VI	1:250	Negative	"	"	..	for <i>B. typhosus</i> .
	VII	1:125	"	"	"	..	Normal temperature.
	VIII	1:1,250	"	"	"	..	Relapse again.
	IX	1:2,500	"	"	"	..	Diarrhoea.
	X	1:500	"	"	"	C	..
6	II	Negative	Negative	Negative	Negative	..	Positive blood culture
	III	1:250	1:50	"	"	..	for typhoid.
	IV	1:125	1:50	"	"	C	..
7	III	1:250	1:125	Negative	Negative	..	..
	IV	1:500	1:500	"	"	..	..
	V	1:125	1:250	"	"	C	..
8	II	Negative	Negative	Negative	Negative	..	Normal temperature.
	III	1:1,250	1:250	"	"	..	..
	IV	1:500	1:250	"	"	C	..
9	II	1:250	Negative	Negative	Negative	..	Normal temperature.
	III	1:1,250	1:250	"	"	..	..
	IV	1:500	1:125	"	"	..	..
	V	1:250	1:125	"	"	..	..
	VI	1:125	1:125	"	"	..	..
	VII	Negative	1:125	"	"	..	Normal temperature.
	VIII	"	1:125	"	"	C	..
10	V	1:250	1:125	Negative	Negative	..	..
	VI	1:125	Negative	"	"	..	..
	VII	1:125	"	"	"	..	..
	VIII	1:2,500	1:500	"	"	..	..
	IX	1:5,000	1:125	"	"	C	Normal temperature.

C = Cured. Titre 'H' = 'H' agglutinin titre. Titre 'O' = 'O' agglutinin titre.

per cent. 64 per cent cases belonged to group b. Mortality in this group was 20 per cent.

Gradual rise in successive weeks and then gradual fall in titre with recovery is a known

fact. This should be so in the majority of cases, but in our series this was observed in only 36 per cent cases, while rest showed variations from usual findings. These variations were not

TABLE II

Findings in Widal reaction, showing various types of variations and fluctuations in respective titres in subsequent weeks, during the illness in relation to complications and mortality

1 Group	2 Number	3 Titre of 'H' agglutinins	4 Titre of 'O' agglutinins	5 Total cases	6 Toxaemia present	7 Positive blood cul- ture for typhoid	8 Number of death	9 Group mortality, per cent	10 Percentage occurrence as a whole of these type of cases
I	1	Negative	Negative	2	1	2	1	50	2.6
II	..	'H' agglu- tinin alone present.	'O' nega- tive.	..	..	..	..	..	..
	1	R	..	6	4	..	2	..	..
	2	F	..	2	1	..	..	..	..
	3	F _n	..	5	3	..	1	..	..
	4	C	..	1	1	..	..	..	..
	5	One reading	..	2	1	..	1	..	..
			TOTAL ..	16	10	..	4	25	21.4
III	..	'H' agglu- tinins negative.	'O' agglu- tinins positive.	..	..	..	..	..	..
	1	..	R	3	2	..	..	..	..
	2	..	F	1	1	..	..	..	..
	3	..	F _n	3	3	..	..	..	..
	4	..	C	..	..	..	..	..	..
	5	..	One reading	2	1	1	2	..	..
			TOTAL ..	9	7	1	2	22	12
IV	..	'H' agglu- tinins positive.	'O' agglu- tinins positive.	..	..	..	..	..	..
	1	R	R	9	5	2	3	..	..
	2	F	F	2	1	..	..	..	..
	3	F _n	F _n	15	7	2	..	..	..
	4	C	C	1	1	..	..	..	..
	5	R	C	2	..	..	..	..	..
	6	F	C	2	..	..	..	..	..
	7	F _n	C	..	..	..	..	..	..
	8	C	R	2	..	..	..	..	..
	9	C	F	1	1	..	..	..	..
	10	C	F _n	..	2	..	..	..	..
	11	R	F _n	2	..	..	..	..	..
	12	R	F _n	2	..	..	..	..	..
	13	F	F _n	..	..	..	..	..	..
	14	F _n	F	2	3	1	3	..	..
	15	F	R	3	..	..	..	..	..
	16	F _n	R	2	3	..	3	..	..
	17	One reading	..	3	..	..	..	..	..
			TOTAL ..	48	23	5	9	19	64
			GRAND TOTAL ..	75	41	8	16	21	..

Abbreviation :—R = Rising titre.
F = Falling titre.
F_n = Fluctuating titre.
C = Constant titre.

same for 'O' and 'H' agglutinins. Significance of these fluctuations is not so clear and rather difficult to understand. The method, suspensions, chemicals and persons concerned in carrying out the test were the same throughout. Sometimes agglutination test becomes even negative during phase of acute illness and then again becomes positive later on. The findings in a few cases are shown in table I. It will be seen from this table how the titres vary in successive weeks. None of the patients had previous T.A.B. inoculation.

In all these, last reading was taken a week after the temperature had touched and remained normal. In some cases 'H' agglutinins alone were present while in others 'O' agglutinins alone were found. In yet others, either both these agglutinins were present or absent. The findings were as follows :—

(i) 'H' agglutinins alone—In 21 per cent cases there were only 'H' agglutinins and, no 'O' agglutinins were detected throughout the illness. Blood cultures in all were negative and there was no history of inoculation with T.A.B. in any one. Titre of 'H' agglutinins did not rise above 1:150 in those four patients who died and in all the rest who survived titre went beyond 1:150 in subsequent weeks. This shows that rise in 'H' agglutinins in subsequent weeks forecasts a better prognosis. This is applicable where 'H' agglutinins alone are present in the blood.

(ii) 'O' agglutinins alone—In 12 per cent cases only 'O' agglutinins appeared, out of which one patient died. No definite conclusion could be drawn from the findings.

(iii) No agglutinins at all—In two cases no agglutinins were detected in the blood throughout the illness, while blood culture was positive for *B. typhosus* during 2nd week. One patient was very toxic from the beginning of the illness and died later while the other survived.

(iv) Both 'O' and 'H' agglutinins were detected in remaining 64 per cent cases. These agglutinins showed many fluctuations and variations in subsequent weeks. These variations were observed and studied in detail, as the test was repeated once every week throughout the illness of the patient. As stated before various types of fluctuations were met with 'O' and 'H' agglutinins.

Significance of either rise or fall of respective agglutinins at various stages and under various conditions is not so well understood. Bhatnagar (1944) observed that "O" titre rises in toxic type of cases and a considerable fall of "O" titre in serum *always preceded recovery*. So persistent high rise of "O" agglutinins must be regarded as pathological. My findings agree with the first part of the above statement but not with the second part. Number of cases in my series is too small to form any definite opinion or inference, and so I will reproduce my findings on these variations in titres in table II.

This table also shows the different types of fluctuations.

1. In some cases, neither 'H' nor 'O' agglutinins appear in the serum throughout the illness of the patient. Blood culture in such cases is usually positive.

2. In some cases, either 'H' agglutinins or 'O' agglutinins alone appear in the serum. In cases of 'H' agglutinins alone, if titre remains below 1:150 even in subsequent weeks, outlook of the patient is not good.

3. Those cases in which 'O' titre gradually falls in subsequent weeks from initial high titre do quite well. This concurs with Dr. Bhatnagar's observation that a considerable fall of 'O' titre of serum always preceded recovery.

4. But corollary of this observation is not always true, as in my work I observed 'O' titre rising gradually from initial lower titre in 13 cases and titre did not fall at all even with clinical improvement of these cases; so high persistent 'O' titre is *not always* to be considered as a bad prognostic sign.

5. It is believed that titres usually rise in successive weeks if patient is showing good resistance, but in 5 cases 'O' titre remained constantly at low level. One out of these five died. This persistent low titre throughout illness cannot be taken as a bad sign in all.

6. Variations of 'H' agglutinins and of 'O' agglutinins are many and it is difficult to draw any definite conclusion from them. All these fluctuations are tabulated in table II. One observation needs a mention. Rising of 'O' agglutinins titre and falling of 'H' agglutinins titre in successive weeks is a bad sign. This was observed in 3 cases and all died.

I thank the authorities of Sir H. N. Hospital, Bombay, for the kind permission to publish this article and Dr. T. C. Kaji, M.B., B.S., who was associated with me in carrying out this study.

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STIBANATE (SODIUM ANTIMONY GLUCONATE) WITH PEDUNCULINE IN THE TREATMENT OF KALA-AZAR

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THE beneficial effects of the use of Pedunculine Pentavalent Antimony Gluconate Compound in a series of fifty cases encourages me to publish the following detailed record of twelve cases in the belief that the introduction of this new preparation will mark a great advance. The patients treated by this new preparation had no

tendency to relapse during an observation period of six months. An immediate response was seen in the rapid fall of temperature, disappearance of the parasites, improvement in the blood, and decrease in the size of liver and spleen. Only six injections were required to complete the course of treatment, whereas, in the control cases, twelve or even more injections were required to have similar improvement in blood and diminution of spleen and liver. All the injections were given intramuscularly on every alternate day. The adult dose is as follows :—

1st week	Stibanate 2 c.c.	I.M. combined. Every alternate day 3 such.
	Pedunculine 3 c.c.	
2nd week	Stibanate 4 c.c.	I.M. combined. Every alternate day 3 such.
	Pedunculine 3 c.c.	

Together with this some liver extract orally was prescribed to combat anaemia.

From the table, I come to the conclusion that in almost all the cases the temperature became normal after the 3rd injection and the aldehyde-test and Chopra-test became negative after the six injections. The addition of Pedunculine to the pentavalent antimony gluconate (stibanate) gives a synergistic action to the antimony salt.

I offer my thanks to Mr. B. P. Dalmia of North Bengal Sugar Mills Ltd., Gopalpur, for giving me facilities to work in his Charitable Dispensary and to Dr. Prahlad Chandra Bysak, L.M.F., for examining the blood of the patients.

N.B.—Stibanate and Pedunculine are available at Gluconate Ltd., Calcutta (135, Prinsep Street), Calcutta.

Table showing the record of cases

Serial number	Sex	Age	A. T. and C. T.	Number of injections	Conditions of cases	REMARKS
1	M., M.	40	+++	6	Relapse after 3 years	Temperature became normal on the 2nd injection. Epistaxis stopped, spleen liver diminished in size after 6 injections. Blood negative.
2	H., M.	9	++	6	New case, suffering 1 year.	Temperature became normal on the 3rd injection, spleen liver diminished in size. Blood negative.
3	H., M.	40	Doubtful	6	Four months suffering	Temperature dropped on the 1st injection. Spleen liver diminished in size. Blood negative.
4	M., F.	8	+++	6	Suffering for 1 year with canerum oris.	Temperature dropped after 4 injections. Canerum oris improved. Blood negative.
5	M., M.	11	+++	4	Suffering for 1 year indolent ulcer, left leg.	Died after 4 injections.
6	H., F.	35	+	6	Two months suffering	Temperature became normal after 3rd injection. Blood negative after 6 injections.
7	H., M.	12	Doubtful	6	Suffering for 5 months	Temperature became normal after 2nd injection. Spleen liver diminished in size. Blood negative after 6 injections.
8	M., F.	28	+++	6	Suffering 1 year. 16 pentavalent antimony I.V., no result.	On 3rd injection temperature continued normal. Blood negative after 6 injections.
9	M., M.	32	+++	6	Nine months suffering. Antimony intolerance.	Tolerated this preparation nicely. Temperature dropped in 2nd injection. Spleen liver diminished in size. Blood negative.
10	H., M.	26	+++	6	Antimony resistant. I.V. 12 injections, no result.	On the 3rd injection temperature dropped and continued normal. Blood negative after 6 injections.
11	H., M.	12	++	6	Relapse after 1 year	Temperature normal on the 2nd injection. Spleen liver diminished in size. Blood negative after 6 injections.
12	M., M.	20	+++	6	New case for 6 months	Temperature dropped on the 3rd injection and continued normal. Spleen liver diminished in size. Blood negative after 6 injections.

THE INCIDENCE AND CAUSATION OF GLYCOSURIA IN PREGNANCY.*

Part I

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DURING the last two decades notable progress has been made in the knowledge of glycosuria in general and glycosuria during pregnancy in particular. It is realized nevertheless that this knowledge is far from being complete. However, adequate methods for the routine diagnosis and successful control of glycosuria during pregnancy have been found and developed so that advantage may be taken of them in the treatment of this condition.

Important and useful information on the aetiology of glycosuria has come at different times through a number of investigators and through improved methods of technique and advanced knowledge of anatomy, physiology, pathology as well as other sciences, particularly organic and biochemistry.

The glycosuria in pregnancy is however a problem of more recent investigation. Cammidge (1913) considered the sugar present in urine during the later months of pregnancy to be chiefly lactose but from further works by Joslin, Lawrence, Shir, Edward Allen, W. J. Dieckmann, Priscilla White, Addressi and others, it has been definitely established that the sugar so persistently present in urine during pregnancy is glucose and not lactose as was at one time supposed. Lactosuria in pregnancy according to Joslin (1935) is rare and according to him the incidence of glycosuria in pregnancy is increased when the pituitary prolactin of the blood is high.

Addressi (1936) opines that the threshold for glucose is lowered during pregnancy. This he believes is due to the increased tonus of the segment which innervates the kidney.

Lawrence (1939) in his book 'The Diabetic Life' says that temporary renal glycosuria is common in pregnancy after the 5th month. According to Shir (1939) alimentary and renal glycosuria are prone to develop after the middle of pregnancy and complicate the treatment of diabetes, when present.

Allen (1939) states the enlargement of the foetus (which is a common feature in diabetic cases) was noted even in non-diabetic glycosuria cases.

Lawrence (1940) stated that 'pregnancy often produced a temporary lowering of the renal threshold of glucose. It is common both in diabetics and non-diabetics. It is perhaps due

to an effect of changed pituitary activity or changed kidney function. The cause of this lowered threshold is still obscure'.

There is thus a divergence of opinion with regard to the causation of glycosuria during pregnancy. The cause of it is still obscure as has been well emphasized by Lawrence. Under these circumstances an investigation on the incidence and causation of glycosuria in pregnancy was undertaken.

Experimental

The experimental work on pregnant women was carried out on the out-patients attending antenatal clinic of the Nowrojee Wadia Maternity Hospital, Bombay, and on the in-patients attending the antenatal ward of that hospital. Investigation was also carried out on the out-patients of the Hospital for Women and Children, Tardeo, Bombay. The cases were selected exclusively from the free patients of the poor class attending these hospitals with the idea of getting a full co-operation in the conduct of the enquiry.

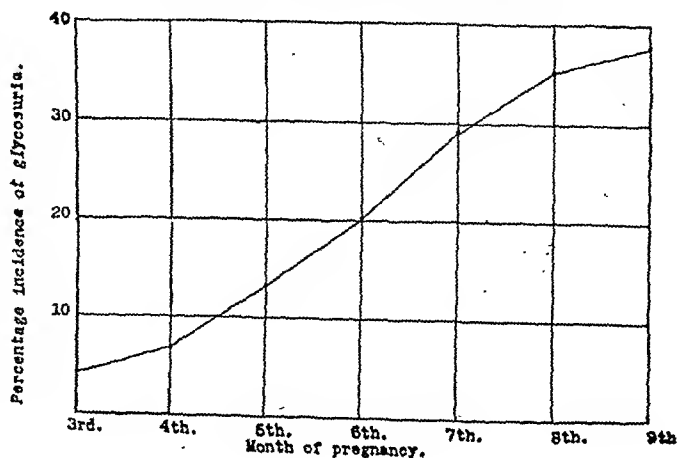
In all 540 cases were examined. Detailed history of each was taken. Particular attention was paid in noting the quality and quantity of diet of each patient. Specimen urine of each case was arranged to be collected 3 hours after the normal midday meal. Examination of the urine was made at the Biochemistry Laboratory of the Seth G. S. Medical College, Bombay. As this institution is opposite the Maternity Hospital, very little interval elapsed between the passing and examination of the urine. The urine was mainly tested for glucose and other abnormal constituents such as albumin, indican, lactose and acetone bodies. In order to differentiate between glucose and lactose fermentation, osazone tests were performed. Results are shown in the table and in graphs I to V.

Discussion

The incidence of glycosuria in the later months of pregnancy is higher and shows a gradual increase in graph I. The incidence of glycosuria among vegetarians and non-vegetarians is shown

Graph I.

Incidence of Glycosuria in different months.



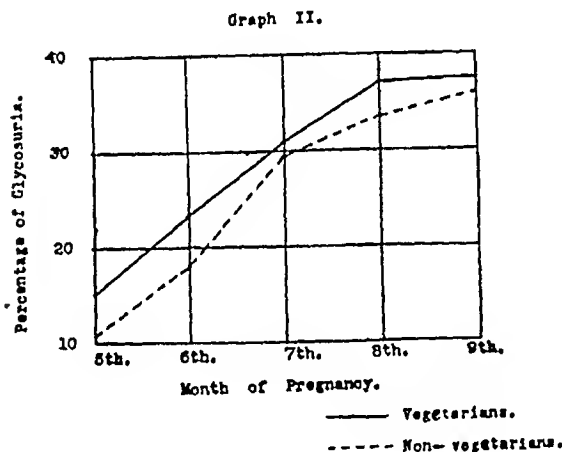
*The papers that are intended to be published under this head form the subject-matter of a thesis approved for the Ph.D. degree of the Bombay University. The work reported herein was done under the guidance of Professor S. P. Niyogi in the Physiology Department of the Seth G. S. Medical College, Bombay.

TABLE

Showing incidence of glycosuria and other abnormalities in different months of pregnancy

Month	CASES			PER CENT INCIDENCE OF GLYCOSURIA								OTHER ABNORMALITIES			
	Total	Vegetarian	Non-vegetarian	Total	Vegetarian	Non-vegetarian	Calcium		Vitamin C		Lactose	Albumin	Acetone	Indican	
							Rich	Poor	Rich	Poor					
3	25	6	19	4.0	..	..	..	..	..	..	..	1	..	..
4	29	11	18	6.9	..	..	..	..	..	..	..	1	..	1
5	76	47	29	13.1	14.7	11.9	10.8	15.4	3.7	18.3	..	3	15	..	
6	90	28	62	20.1	23.1	17.7	18.1	22.4	5.0	24.3	..	4	9	2	
7	126	77	49	20.0	30.3	29.1	29.0	31.0	6.4	38.0	..	6	22	..	
8	114	57	57	35.2	36.8	33.3	32.2	38.4	8.3	42.2	..	2	24	4	
9	80	42	38	37.5	37.2	35.9	33.0	40.0	13.0	49.1	4	9	13	3	

in graph II. It will be seen that there is some difference in incidence between vegetarians and non-vegetarians.

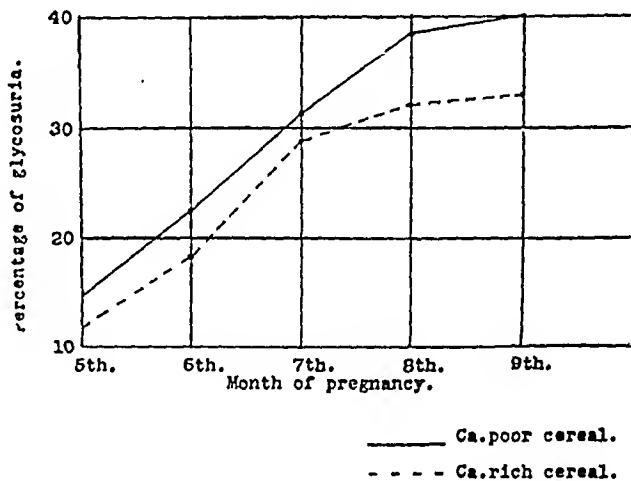


It must however be noted that the so-called non-vegetarians of poorer class of people in Western India take too little of animal diet per day. Those who take even 1 oz. of animal diet (meat or fish) per day (a very small quantity compared to the Western or European standards) have been classed as non-vegetarians. Otherwise, there would have been a greater difference in the incidence of glycosuria between the vegetarians and the non-vegetarians.

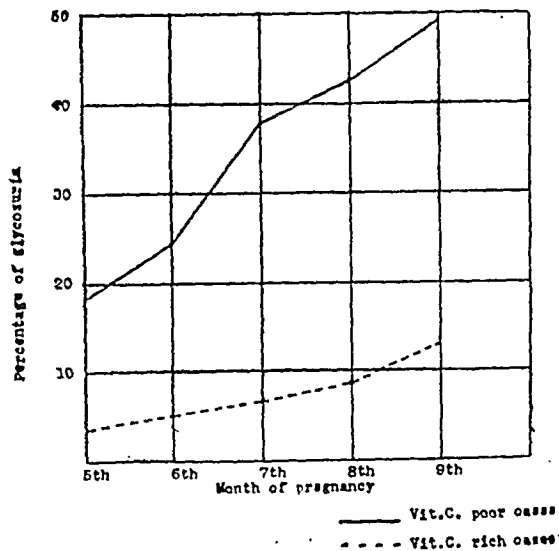
Among the poor section there are some whose cereal food consists mainly of rice and there are others who take wheat, millets, etc., in addition. Incidentally it was found that calcium rich food and calcium poor food made a difference. The incidence of glycosuria in cases taking a calcium poor cereal and calcium rich cereal is shown in graph III.

The difference is all the more marked from the 7th month onwards. According to Swanson and Job (1939) the mineral intake, especially of calcium, gradually increases in a foetus from

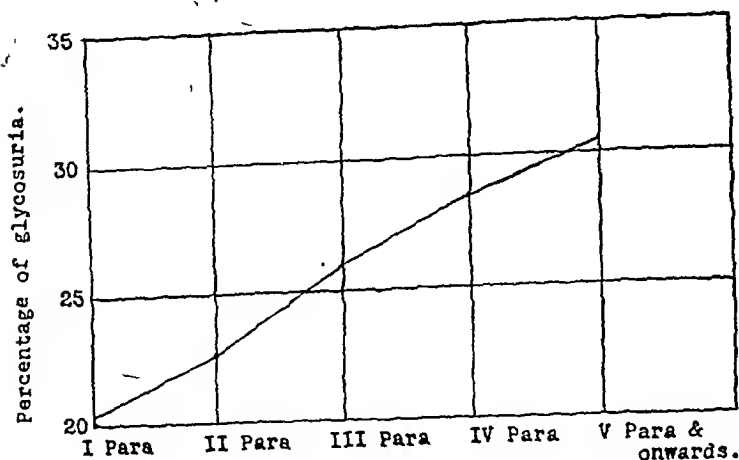
Graph III.



Graph IV.



Graph V.



month to month from the 5th month onwards. Winkler and Fritsche (1939) have found the concentration of calcium in the foetal tissue to run parallel with the advancement of pregnancy. Thus, as the foetal demand increases there is a tendency to a decrease of calcium in the maternal blood unless an adequate calcium rich diet is taken.

Effect of vitamin C content of the diet is interesting. The incidence of glycosuria in cases consuming a vitamin C rich food is lower as compared to cases taking a vitamin C poor diet. The difference is seen in graph IV.

Fruits are taken as articles of diet rich in vitamin C and a pregnant woman who took one sweet lime (*Citrus medica* var. acid) or an orange (*Citrus aurantium*) or any other fruit containing an equivalent of over 50 mg. of vitamin C per day was classified as a case taking vitamin C rich diet.

It is true that fresh leafy vegetables are very rich in vitamin C, but the people of Bombay hardly get them fresh. Besides, the bulk of vitamin C in vegetables is destroyed in cooking. Frying and even boiling in the presence of plenty of oxygen (as is done by the poorer classes of people in Western India) lead to rapid and almost complete destruction of vitamin C. In graph V is shown the incidence of glycosuria in primipara, bipara, etc.

Summary

1. The reducing sugar so often found in the urine of pregnant woman is usually glucose. It is not lactose. The latter is not found until the 9th month of pregnancy and that too a few days before the onset of labour and its percentage is very small.

2. The incidence of glycosuria shows a gradual and a definite rise from month to month, as pregnancy advances.

3. The incidence is greater in the vegetarians than in the non-vegetarians.

4. This incidence is greater in cases taking calcium poor diet than in those taking calcium rich diet and the difference in this incidence is more pronounced in the last two months of pregnancy.

5. This incidence is far greater in cases taking a diet poor in vitamin C than in those taking a diet rich in this ingredient. The difference in this incidence becomes all the more pronounced in the last months of pregnancy.

6. This incidence is greater in subsequent pregnancies, i.e. the least in primipara, a little more in bipara, still more in third para and so on.

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PARENTERAL QUINACRINE IN MALARIAL FEVERS

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THE cases reported in this article were treated in the medical department of the Ludlow Jute Mills situated in village Chengail in the Howrah district. The village is situated on the north bank of river Hooghly about 17 miles from Calcutta. The patients were mainly the labour force employed by the Ludlow Jute Mills and Press, resident partly on company-owned premises and partly in the nearby villages. A small percentage was from among the dependants of the employees.

Table I shows the normal incidence of malarial fevers as well as the epidemic incidence during 1944-45.

TABLE I

All malaria cases (acute attacks and relapses)

Month	1941	1942	1943	1944	1945
January ..	122	74	52	238	145
February ..	143	174	59	108	140
March ..	170	105	55	68	146
April ..	78	71	65	93	141
May ..	138	53	65	98	127
June ..	139	66	63	66	150
July ..	184	80	54	203	340
August ..	144	107	54	335	560
September ..	160	80	61	286	901
October ..	195	85	150	326	1,152
November ..	185	128	360	453	1,131
December ..	129	86	323	245	898
Total ..	1,725	1,087	1,351	2,516	5,831
Population ..	7,933	6,230	4,708	3,954	4,127
Cases per 1,000 p.m.	18.15	14.5	23.8	53.2	117.7

It will appear from table I that the incidence of malarial fevers suddenly began to rise in July 1944 at a time when quinine had become rather difficult to obtain and injectable form of quinine had become unavailable.

Our reason for using parenteral quinacrine

From July 1944 to September 1944 we used quinacrine tablets orally in the ordinary manner, namely, one tablet three times a day after meals for 5 days. We found that it took 3 or 4 days for the temperature to become normal and these 3 or 4 days of fever rendered the patient weak enough to require another 3 or 4 days to recoup sufficient strength to come back to mill work. In this series there were 824 cases of which 16.4 per cent had relapsed after a mean afebrile period of 17 days. The average number of days when the patient could not resume duties was 7 and the average loss of wages to the workman was for one week. As the epidemic was assuming severe proportions the man-hours lost were fast becoming a problem from the point of view of stoppage of production. Then again pernicious types of malaria had made its appearance. Its incidence was 4.1 per cent of all malaria cases. The third factor was the high incidence of chronic gastritis among the labouring classes brought on by poor and constantly changing quality and adulteration of the foodstuff and all the sequences of the famine of 1943. Considering all these factors we started the injection of quinacrine solution from the month of October 1944.

Preparation of the solution.—Quinacrine hydrochloride is soluble in 1 in 30 of water so that one tablet is soluble in 3 c.c.

Nine hundred tablets were dissolved in 2,700 c.c. of distilled water in a tall glass jar.

In 3 hours the tablets completely disintegrated and the solution was stirred from time to time during the first 12 hours and less frequently on the 2nd day by the end of which all stirrings ceased and the solution allowed to stand for 24 hours. All the pill-binding material had settled at the bottom as a white precipitate leaving a perfectly clear supernatant fluid. This was siphoned into Erlenmeyer's flasks. This solution was boiled after adding about 15 c.c. of distilled water to about 700 c.c. of solution to compensate for the water lost by evaporation. The solution was boiled for exactly 3 minutes and then allowed to cool. It was ready for injection. Each 3 c.c. of this solution contain 0.1 gramme of quinacrine hydrochloride.

It is to be noted that the solution does not stand autoclaving or prolonged boiling. We tried autoclaving under 15 lb. pressure and a precipitate formed at the bottom of the ampoule. Prolonged boiling has the same effect. Both these processes made the solution unfit for parenteral use.

It was also found that certain brands of quinacrine or mepacrine tablets did not give as clear a solution as the Lilly brand which was used in most of the cases, otherwise the solution had to be filtered through a small sand filter made in a funnel, using cleaned and sterilized sand. This process was resorted to as filter paper was very costly and difficult to obtain.

Method followed

Quinacrine solution was always injected intramuscularly into the gluteal muscles. Only one injection of 9 c.c. or 12 c.c. was given to each case irrespective of the stage of the fever. There was much local soreness at the site of injection. Kneading for a few minutes after the injection reduced the after soreness to a minimum but it was not advocated except in case of females as it was found that in those cases where pain and tenderness at the site of injection had persisted for ten days to two weeks invariably there were no relapses.

The patient was given a dose of alkali containing 20 grains of sodium bromide and sometimes 10 grains of aspirin according to necessity. No quinacrine was advocated by mouth the same day. The patient was always given half to two and a half days' leave from mill work and was not at least allowed to go back to the factory on the day after he had received an injection. This precaution was taken as a few patients had felt giddy and in the terrific noise inside the factory had actually fallen down.

When the patient returned from leave (maximum 2½ days) he was given quinacrine by mouth to make up the total up to 1.5 grammes.

In all the above cases without exception there was no rise in temperature after the current spell of fever had subsided.

The patient was back to work usually on the 3rd day and at the latest on the 4th day.

TABLE II
Cases treated

	Quantity injected per case, c.c.	Number of injections per case	Number of cases treated	Number of relapses	Percentage relapse	Afebrile period in days
Group I ..	9	1	2,014	279	13.3	7 to 34
Group II ..	12	1	4,483	446	9.9	13 to 29
		TOTAL ..	6,497	725	Mean 11.6	

In a very small percentage of cases the fever persisted after the injection from 12 hours up to 3 days. In these cases only alkaline bromide mixture was continued until the fever subsided. Quinacrine tablets or solution was used orally only after the fever had subsided.

Untoward symptoms.—So much adverse opinion among the public against use of yellow tablets had been created that we first started using the tablets with some difficulty and had to camouflage the mepacrine in a mixture form. The injections of quinacrine had to be declared as a new kind of injection for malaria. Majority of patients showed no symptoms of intolerance to quinacrine.

In this series of 6,497 cases there were only 59 cases of minor symptoms such as feeling of heat in the head, giddiness, palpitation, slight epigastric pain and intense headache.

There were only 2 cases with major mental symptoms. These patients had to be hospitalized.

In both these cases the patient became violent and maniacal within 4 hours of the injection. They had to be controlled by 3 or 4 men and the clinical picture was very similar to that of acute alcohol poisoning. Alkaline glucose 25 to 50 c.c. intravenously every 3 hours and hyoscine 1/100 grain after every 6 hours (not more than 2 injections were needed) quietened down the patients to a great extent quickly. An alkaline bromide mixture containing 20 grains of sodij bromide per dose was continued by mouth every 4 hours. Both the patients became well within 60 to 72 hours.

Thus it will appear that the demerits attributed to quinacrine by certain sections of people seem to be an exaggeration.

Solution of quinacrine used by mouth was prepared by taking the unboiled solution prepared in the manner above described, and making up the 3 c.c. into 1 ounce by adding tap water and colouring the solution with methylene blue. This effectively camouflaged the yellow colour of the mepacrine and had a very pleasant hue, and the patients who objected to the tablets gladly took this mixture like the old quinine mixture thrice daily after food.

Summary and conclusions

1. Quinacrine hydrochloride in the treatment of malarial fevers has been used parenterally in

6,497 cases very effectively with a mean relapse rate of 11.6 per cent.

2. Parenteral use of the drug has reduced the labour absenteeism and consequent loss of wages by fully 50 per cent.

3. There were only two cases of major mental symptoms among 6,497 parenterally treated cases who completely recovered by the 4th day and the minor symptoms of intolerance were outweighed by the antimalarial efficiency of the drug. There was no fatality in the series of 6,497 cases.

4. Parenteral use of quinacrine is a very effective armament in our hands in a fight against malaria in an epidemic particularly among the labour forces.

INCIDENCE OF MALARIA IN CALCUTTA CITY

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and

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It is rather difficult to say to what extent malaria is at present endemic in Calcutta city. Rogers (1906) reported 175 European malaria cases (*Plasmodium vivax* 79, *P. malariae* 3 and *P. falciparum* 93) who were admitted to the Presidency General Hospital during the period September, 1904 to December, 1905. Lukis (1907) recorded 119 malaria cases (*P. vivax* 41, *P. malariae* 2 and *P. falciparum* 76) who were admitted into the Calcutta Medical College Hospital during one year. Megaw (1907) noted 301 malaria cases (*P. vivax* 100, *P. malariae* 25 and *P. falciparum* 163; *P. vivax* and *P. malariae* 2; *P. vivax* and *P. falciparum* 10; and *P. malariae* and *P. falciparum* 1) in one year in the Outpatient Department of the Calcutta Medical College. He further noted that nine-tenths of these cases were domiciled in Bengal. Rogers (1919) gave the figures for the European hospital malaria cases observed in two years in Calcutta which were 200 (*P. vivax* 96, *P. malariae* 5 and *P. falciparum* 99). Knowles and Senior White (1930) reported 697 positive cases for malaria (*P. vivax* 232, *P. malariae* 73, and *P. falciparum* 392) as observed in four years, namely 1925 to 1928, in the Outpatient Department of the Calcutta School of Tropical Medicine.

Covell (1932) showed that the spleen indices among municipal school children, aged 6 to 10 years, varied from 0 to 3.8, with parasite indices from 0 to 15 in different wards of the city. The total number of positive cases recorded was 85 (*P. vivax* 17 and *P. falciparum* 68). Knowles and Basu (1934) reported 1,633 malaria cases who were admitted as in-patients at the Presidency General Hospital, the Indian Military Hospital and the Calcutta Medical College Hospital for the years 1928 to 1931 inclusive. An analysis of the malaria cases who attended the Outpatient Department of the Calcutta School of Tropical Medicine was conducted by the authors for the period between 1925 and 1935 (both the years inclusive). The total number of cases was 2,095, of whom 640 showed infection with *P. vivax*, 226 with *P. malariae*, 1,077 with *P. falciparum*, 124 with a mixed infection of *P. vivax* and *P. falciparum*, 13 with *P. vivax* and *P. malariae*, 9 with *P. malariae* and *P. falciparum*, 3 with *P. vivax*, *P. malariae*

and *P. falciparum* and lastly, 4 with malarial infection, the species of which could not be determined. The detailed figures are shown in table I.

Out of these cases the highest peak was seen in 1932 and lowest in 1935. The annual incidence of the cases, as observed, is represented in chart I.

A study of the seasonal incidence of these cases reveals that the highest peak was in November and the lowest in April. August, November, December and January are the months when comparatively more cases attended the Outpatient Department. The detailed figures are shown in table II and also represented in chart II.

As to the relative incidence of the three species of the above malaria cases (total figures for 11 years), *P. falciparum* was most prevalent, then came *P. vivax* and lastly *P. malariae*. Table III showing detailed figures will corroborate this statement.

TABLE I
Annual incidence of malaria cases

Years	B.T.	Q.	M.T.	Mixed infection	Species undetermined	Total number of malaria cases
1925	39	19	108	4	..	170
1926	57	19	124	12	..	212
1927	54	16	83	4	2	159
1928	42	15	59	10	1	127
1929	54	24	78	24	1	181
1930	50	18	94	20	..	182
1931	94	22	101	18	..	235
1932	84	19	190	14	..	307
1933	70	27	101	15	..	213
1934	59	28	96	12	..	195
1935	37	19	43	15	..	114
TOTAL ..	640	226	1,077	148	4	2,095

TABLE II
Seasonal incidence of malaria cases and their percentage

Months	B.T.	Q.	M.T.	B.T. and M.T. mixed	B.T. and Q. mixed	B.T., Q. and M.T. mixed	Q. and M.T. mixed	Species not identified	Total
January ..	67	34	119	15	..	..	1	..	236, i.e. 11.3 per cent
February ..	41	22	76	9	2	..	..	1	151, " 7.2 "
March ..	41	28	76	8	4	..	1	..	158, " 7.5 "
April ..	40	15	27	16	..	..	2	..	100, " 4.8 "
May ..	47	25	55	12	2	..	..	..	141, " 6.7 "
June ..	52	18	39	9	..	..	1	..	119, " 5.7 "
July ..	62	21	78	9	2	1	..	..	173, " 8.2 "
August ..	83	15	101	7	..	1	3	2	212, " 10.1 "
September ..	41	11	103	10	1	1	..	..	167, " 8.0 "
October ..	49	12	96	5	..	..	..	1	163, " 7.8 "
November ..	61	10	164	12	1	..	1	..	249, " 11.9 "
December ..	55	15	143	12	1	..	..	..	226, " 10.8 "
TOTAL ..	639	226	1,077	124	13	3	9	4	2,095

The relative percentage of the three species of the above cases, when taken on a monthly basis, shows that, except in April and June, *P. falciparum* has got a predominating character for the

Chart I showing annual incidence of 2,095 malaria cases (1925 to 1935).

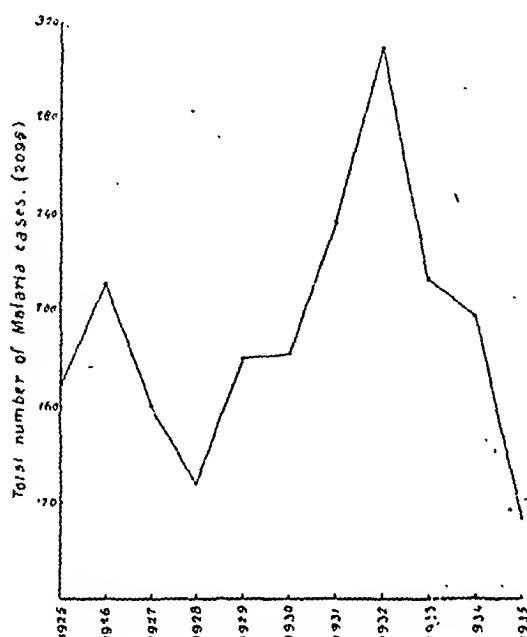
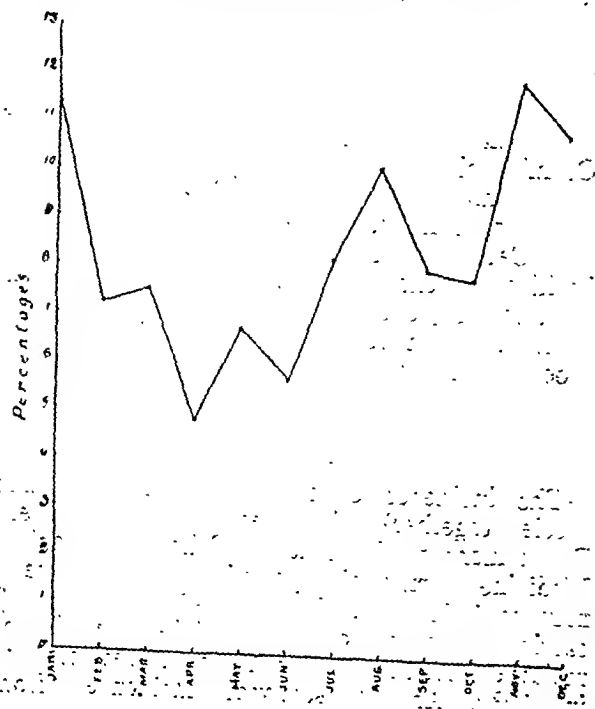


TABLE III
Incidence of the three species

Species	Number of cases	Percentage
<i>P. falciparum</i> ..	1,077	55.5
<i>P. vivax</i> ..	639	32.9
<i>P. malariae</i> ..	226	11.6

Chart II showing the seasonal incidence of 2,095 malaria cases (1925 to 1935).



remaining ten months of the year. During April and June *P. vivax* shows predominating character which might be explained by the fact that this rise is due to the spring relapse of the species; for the remaining ten months of the year this species is less predominating than the former one. As to *P. malariae*, this species is at the lowest level throughout the year. The above statement is represented by table IV. Chart III shows the seasonal incidence of the three species of malaria separately.

Chart III showing the seasonal incidence of three species of malaria separately.

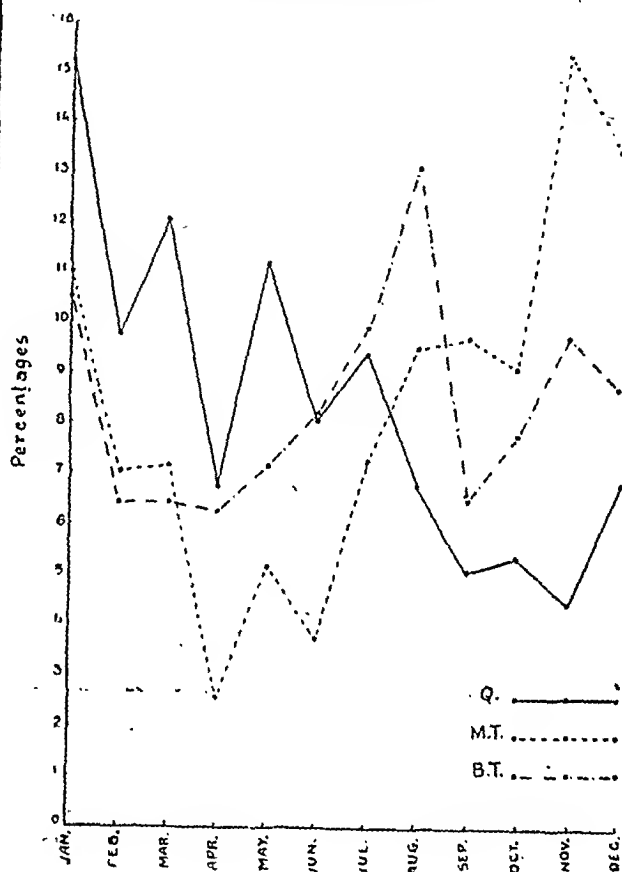


TABLE IV
Relative percentage of three species of malaria

Months	B.T., per cent	Q., per cent	M.T., per cent
January ..	30.5	15.4	54.1
February ..	29.5	15.8	54.7
March ..	28.3	19.3	52.4
April ..	48.8	18.3	32.9
May ..	37.0	19.7	43.3
June ..	47.7	16.5	35.8
July ..	38.5	13.0	48.5
August ..	41.7	7.5	50.8
September ..	26.5	7.1	66.4
October ..	31.2	7.6	61.2
November ..	25.9	4.2	69.9
December ..	25.8	7.1	67.1

Out of those cases, 778 were gametocyte-carriers. The peak of the gametocyte-carriers

was in 1932 which exactly coincides with the peak of the total cases (*vide* chart I) and falls in the curve also coincide with those in the curve of total cases. This statement is represented by table V and chart IV.

Chart IV showing annual incidence of 778 gametocyte-carriers (1925 to 1935).

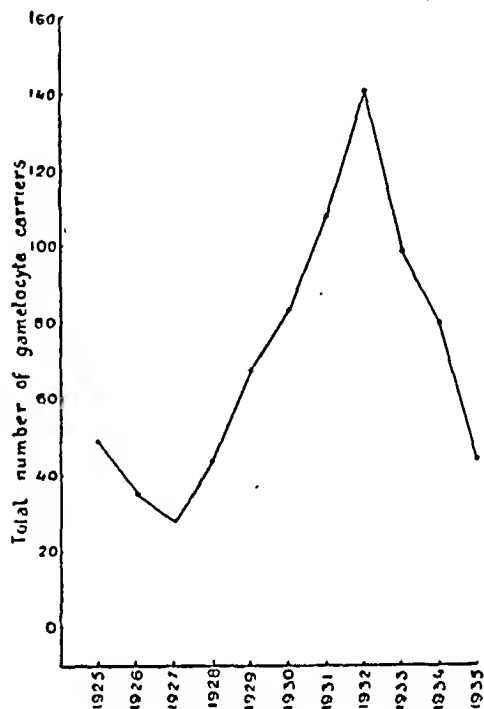


TABLE V

Showing gametocyte-carriers

Years	B.T.	Q.	M.T.	Mixed infection	Total
1925	2	5	42	..	49
1926	3	1	31	..	35
1927	2	5	20	..	27
1928	14	10	20	..	44
1929	15	16	34	2	67
1930	29	11	42	1	83
1931	51	13	40	4	108
1932	57	17	66	1	141
1933	42	20	33	4	99
1934	25	16	37	2	80
1935	11	9	24	1	45
TOTAL ..	251	123	389	15	778

Monthly incidence of the gametocyte-carriers reveals that the highest number of crescent-carriers (*P. falciparum*) was found in December and the lowest in June. The highest number of gametocyte-carriers of *P. vivax* was in August and the lowest in October; as to *P. malariae*, the number of gametocyte-carriers was at a low level throughout the twelve months of the year.

Table VI will represent the detailed figures of the above statement.

TABLE VI

Showing detailed monthly figures of gametocyte-carriers (1925 to 1935)

Months	B.T.	Q.	M.T.	Mixed	Total
January ..	19	13	43	1	76
February ..	16	13	30	3	62
March ..	15	16	26	2	59
April ..	20	11	13	2	46
May ..	30	13	21	3	67
June ..	22	10	9	1	42
July ..	26	13	32	..	71
August ..	33	7	42	1	83
September ..	14	4	35	1	54
October ..	8	9	44	..	61
November ..	19	8	44	..	71
December ..	29	6	50	1	86
TOTAL ..	251	123	389	15	778

As to treatment, those cases diagnosed as malaria but not willing to take admission into the hospital or not admitted into the hospital for want of accommodation, were given standard treatment from the Outpatient Department. Though there are some cases which are undoubtedly of local origin a large number of infections are acquired by persons who go out of Calcutta to malaria-infested places in the rural areas during the puja holidays.

This has already been pointed out by Covell (1932) and Knowles and Basu (1934). Besides this, Calcutta being a treatment centre of the province, people generally come from outside for treatment and most of them stay in Calcutta till their recovery and thus serve as a potential source of danger to the health of the city in the presence of notorious malaria-carrying mosquitoes and so many gametocyte-carriers. At the same time this analysis shows that there is a regular fall of the number of cases from 1932 to 1935 and if this fall continues it may become necessary to have the co-operation of other medical institutions of the city in having their malaria cases transferred into the Carmichael Hospital for Tropical Diseases or to open a malaria centre near Calcutta to obtain cases for conducting researches on malaria in the Calcutta School of Tropical Medicine. Incidentally each hospital of the city, which will treat malaria cases, should have mosquito-proof accommodation for keeping them just as fly-proof accommodation is provided for cholera cases.

Summary

The incidence of malaria eases (all three species together), diagnosed at the Outpatient Department of the Calcutta School of Tropical Medicine during the period of eleven years, namely, 1925 to 1935, was 2,095, of whom 778 carried gametocytes. The highest peak of malaria cases as well as gametocyte-carriers was in 1932. As to seasonal incidence from

February to July their numbers were at a low level and from August to January their numbers were comparatively increased having the highest peak in November. On a study of the relative percentage of the three species of malaria it was seen that *Plasmodium falciparum* was decidedly the predominating species, then came *P. vivax* and lastly *P. malaria* being in the lowest level; from April to June *P. vivax* showed a predominating character which might be due to the spring relapse of the species.

The writers' grateful thanks are due to Sir R. N. Chopra (then) Director and the late Professor B. M. Das Gupta for giving all sorts of facilities for this analysis.

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PHENYL CELLOSOLVE IN THE TREATMENT OF PEDICULOSIS

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and

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DAVIS and his co-workers (1944) experimented with phenyl cellosolve (monophenyl ether of ethylene glycol) using a mixture of phenyl cellosolve, ethanol and water in proportions of 1 : 2 : 2 with enough methyl salicylate to give it a slight pleasant odour. The material was used against head lice. The results, though not fully evaluated, were however thought to have been completely satisfactory.

Hansens (1945) later carried out tests on the heads of school children with mixtures containing 20, 10, and 5 per cent phenyl cellosolve respectively. When examined at intervals after treatment it was noticed that all lice and eggs were killed by all three concentrations. The composition of the weakest preparation was 5 per cent phenyl cellosolve, 37.5 per cent alcohol, 56.5 per cent water, 0.9 per cent methyl salicylate and 0.1 per cent 'Tergitol' penetrant 7. No toxic effects were noted with any of the preparations.

Messrs. Carbide and Carbon Chemicals Corporation, New York, the manufacturers of phenyl cellosolve, were kind enough to place an adequate quantity of this material at our disposal for experimentation on lice.

Laboratory studies on the penetrative properties of this mixture into the substance of

the nit, as can be deduced from the surface tension, were made by pouring a minute drop on a big surface of water. The rapidity and the extent of its spread were very suggestive of its ability to pass through the pores of the operculum and reach the embryo within the nit.

In order to determine the actual efficacy of phenyl cellosolve against eggs of lice, nits attached to hairs were just dipped in the mixture and were quickly taken out. These were examined from day to day. In all cases so treated the nits did not hatch.

The experiments conducted by us were carried out on hospital patients and for the purpose of evaluating the results only those who stayed for at least two weeks after treatment have been considered.

The mixture was applied to the hair of the scalp by means of a wad of cotton wool, sufficient quantity being used to wet the hair thoroughly. Care was taken to prevent the fluid from running into the eyes.

The tests were made on 22 patients of different ages varying from 4 years to 54 years, and except 2 patients, all were females and all had long hair. The infestation was generally heavy and in every case both adult lice and nits were present. All tests were made with preparations containing 5 per cent phenyl cellosolve and in 8 cases isopropanol instead of absolute alcohol was used. The composition of the mixture was as follows :

Phenyl cellosolve	..	5 c.c.
Absolute alcohol or isopropanol	37.5 c.c.	
Water	..	57.5 c.c.

It is worth noting that phenyl cellosolve does not mix with any mineral oil, nor with rectified or methylated spirit.

When necessary the patients were allowed to wash their hair two hours after the treatment was completed.

The results showed that phenyl cellosolve when used in 5 per cent strength is potent against both adult lice and nits. Regarding any untoward symptoms, only two patients complained of slight sensation of heat and tingling which were not marked and these passed off within 5 minutes. There were no remote effects.

The above preparation was also tested against *Phthirus pubis* on a patient who was heavily infested. Both adults and nits were found on beard, and on hairs on the axillæ and in the pubic and perineal regions. Only one application brought about the destruction of the louse population including the eggs.

In passing it may be mentioned that we have noticed for the first time the presence of *P. pubis* on beard and on axillary hairs in sufficient numbers.

Tests with the same material on heads complicated with secondary pyogenic infection and ulceration are in progress and the results will be communicated in due course.

One of us reported a short time ago on the successful treatment of pediculosis of the head with pyrethrum extract diluted with kerosene. This affects both adult lice and nits and only one application is necessary to effect a cure (Roy, 1946).

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SPOROTRICHOSIS OF THE SKIN IN INDIA

(A NEW SPECIES DESCRIBED) *

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In a tropical country like India the incidence of sporotrichosis is expected to be common with other dermatomycosis, but excepting one case there is no other record on the subject. This scarcity of reports may be due to actual rarity of the disease or its non-recognition by physicians. The only case reported was by one of the authors (Ghosh, 1932). During the last 15 years 12 more cases have been recorded at the School of Tropical Medicine, Calcutta, but those were clinically diagnosed without any laboratory confirmation.

The incidence of sporotrichosis as recorded in other countries is more common amongst farmers, gardeners, florists, industrial workers, etc., and the case under report falls in the first group.

Case report.—An Indian female, 40 years old, a vegetable dealer by occupation. She had a small ulcer about $\frac{1}{2}$ inch in diameter on the lateral side of the right wrist and a small nodule $\frac{1}{4}$ inch in diameter about 4 inches proximal to the ulcer. The patient gave a history of a slight injury—a prick—at the site of the ulcer while handling vegetables. It healed up soon; but subsequently a small nodule developed at the site, red, hard and painful; this gradually softened and burst into an ulcer with sero-purulent discharge. Another nodule appeared very soon about 4 inches above the first one when she came for medical help. The second nodule was red, painful and softening at the time of examination.

Clinical findings.—Blood serum—Wassermann reaction and Kahn test were negative.

Blood count—Within normal limits.

Urine analysis—Normal.

Diagnosis.—The nodule was incised and the material from it was put up for culture in

Sabouraud's medium. On the 7th day a visible growth appeared on the surface of the medium. Microscopic examination showed the growth to be a sporotrichum.

Treatment.—The patient was put on potassium iodide grs. x three times daily and recovered soon.

Study of the fungus.—The primary culture was made on Sabouraud's proof medium. A visible growth appeared on the 7th day at room temperature (varying from 22° to 32°C.). At first it was cream coloured and raised with uneven and corrugated surface. As the age increased the colour changed to brown and then to dark brown and the growth became wrinkled and cerebriform at the centre but flush with the surface of the media at the periphery (see figures 1a and 1c, plate IX). In old cultures excrescences appeared on the surface of the growth (see figure 1b, plate IX). On potato the growth was appreciable on the 6th day, cream white in colour at first but gradually blackening. In a month's time the entire surface of the potato was covered with thick, coal-black cerebriform growth. In other common laboratory media the growth was like that on the Sabouraud's medium.

Microculture in hanging drop preparation.—Growth was profuse, the mycelial hyphae were septate and about 2 microns in diameter. The conidial spores were either round or oval, mounted on short stems (sterigma) and situated along the length of the mycelium and also grouped in fours or eights at the ends of the mycelial branches. The round spores were about 3.2 microns in diameter and the oval ones about 4 microns in length and 3 microns in breadth. Chlamydospores were very few (see figure 2, plate IX).

Biochemical reactions.—

Glucose gelatine—Growth was satisfactory, gelatine not liquefied (18° to 20°C.).

Serum (inspissated)—No proteolysis.

Litmus milk—No change.

Fermentation of sugars—Sugar fermentations were remarkably constant on repeated experiments. The original culture and cultures of the fungus recovered from experimental passage through laboratory animals gave the same reaction, viz, acid without any gas formation in dextrose, laevulose, maltose, galactose, mannose, dextrin, xylose and mannite (late fermenter). There was no reaction in lactose, sucrose, inulin, sorbite, inositol, arabinose, adonite and raffinose.

Pathogenicity to animals.—The fungus was pathogenic to all the laboratory animals, e.g. mice, rats, guinea-pigs and rabbits. Intra-peritoneal injections of an emulsion produced typical lesions on the testes, such as multiple abscesses developing into caseating ulcers with intensive destruction of the glandular tissue. The virulence of the fungus was intensified by passage through animals, as in the later experiments the animals had very severe infections

* Read in the Indian Science Congress, January 1947.

TABLE
A comparative table showing differences of various pathogenic species of *sporotrichum*.

Name of species	Character of growth	Optimum temperature of growth	Colour in different media	Mycelia and their size	Conidia	Shape and size of conidia	Glucose gelatine	Sugar reaction	Serum	Pathogenicity	Fungus in infected tissue
<i>S. tropicale</i> (the new species).	Cerebri-form, convoluted.	22°-32°C. No growth at 37°C.	Sabouraud—cream at first; brown to deep brown later. Potato—cream changing to black.	1.6-2µ in diameter.	Numerous, on sterigma; groups of 4 to 8. Terminal or lateral.	Round—3.2-4µ in diameter. Oval—3×4µ.	No liquefaction at 18°C.	Lactose —* Sucrose — Inulin — Mannite + (late) Glycerine + Dextrin +	No proteolysis.	Very pathogenic to mice and rats and also to guinea-pigs and rabbits. Do.	Round bodies in groups. Bacterial form present.
<i>S. beurnmanni</i>	Cerebri-form, convoluted.	22°-32°C. Slow growth at 37°C.	Sabouraud—white at first then dark brown. Potato—cream changing to black.	2µ in diameter.	Numerous, sterigma rare; terminal or lateral.	Pyriiform 1-2×0.5µ long. Round or oval 3-5×2-4µ.	Slight liquefaction.	Lactose — Sucrose + Inulin + Mannite — Glycerine + Dextrin —			
<i>S. schenckii</i>	Radiating furrows from the centre.	30°-38°C.	Sabouraud—white or light brown. Potato—yellow becoming brown.	Undulating. 2µ in diameter.	Few, on sterigma; lateral.	3-5µ in diameter. Oval or apiculate.	Slow liquefaction.	Lactose + Sucrose — Other sugars not known.	No proteolysis.	Very little.	Yeast like 3-5µ or bacterial form.
<i>S. jeanselmei</i>	Like <i>S. beurnmanni</i> or tomentose.	35°-37°C.	Sabouraud—creamwhite to old ivory. Potato—glucose-cream to coal-black 14th day.	1.5-2µ	Tufts of 4 to 5 spores, on sterigma; terminal or lateral.	Round 2.5-3.5µ. Pyriiform 4×2.4µ.	No liquefaction.				
<i>S. asteroides</i>	Like <i>S. beurnmanni</i> or <i>S. schenckii</i> .	30°C. Growth slow at lower temperature.	Sabouraud—first white later black. Potato—no pigment.		Lateral or terminal.	4-8µ	Slow liquefaction.			Rats and mice.	Spherical bodies 4-12µ with ray shaped radiating bacillary bodies, suggesting those of <i>Actinomyces</i> bodies. Yeast form present.
<i>S. carougeaui</i>	Like <i>S. beurnmanni</i> .	19°-22°C.	Sabouraud—cream. Potato—white or greyish.	2.5-5µ (mean 3µ).	On sterigma	Ellipsoid 2×4µ later spherical, 4-5µ in diameter. Pyriiform 7.6×2.5-3.5µ.	Liquefaction.				
<i>S. counclimani</i>		30°C.		1-1.2µ	Numerous on sterigma, solitary or in clusters. No lateral conidia.					Rabbits and guinea-pigs.	Branching filaments in lesion.

Spaces have been left blank where the details are not available. Sugar reaction: — + indicates acid formation; — no acid formation. * For other sugars vide text.

and died rapidly. From all the experiments the organism was recovered in pure cultures.

Identity.—Compare table.

Character of the growth.—Like that of *S. beurmanni*, but unlike *S. beurmanni*, the growth of this fungus ceases at 37°C.

Colour of the growth.—Like that of *S. beurmanni*.

Morphology.—Spore formation is different from any known pathogenic species in the size and character of the spores.

Pathogenicity.—Like *S. beurmanni*.

Biochemical reaction.—Different from *S. beurmanni* and *S. schenckii* in some respects but widely different from other pathogenic species.

From the above it seems that the fungus under study is not identical with any known pathogenic species.

Discussion.—There is still some difference of opinion as to whether *S. schenckii*, the American type, and *S. beurmanni*, the European type, are one and the same species. These two have been differentiated (a) on the difference of colour in the growth and (b) some difference in their biochemical reactions on sugars.

It is well known that the colour of the growth of a fungus varies enormously with the difference in the culture media, the temperature and the oxygen tension. Hence the colour variation in the growth cannot be regarded as a reliable factor in differentiating the species.

The biochemical reaction on sugars is a more reliable point for differentiation than the colour variation in the growth.

The species under study resembles the European type *S. beurmanni* in (1) character of the growth, (2) colour of the growth and (3) pathogenicity. But it differs from *S. beurmanni* in (1) optimum temperature of the growth, (2) spore formation and (3) biochemical reactions in sucrose, inulin, dextrin, glucose, gelatine, etc. (*vide* table).

Conclusion.—As the fungus cannot be identified with any of the known species it is proposed to be named *Sporotrichum* (Rhinoeladium) *tropicale* n.sp.

Summary

(a) A case of sporotrichosis of the skin in an Indian female vegetable dealer is described.

(b) Literature on this subject is very scarce in India; this is probably the second authentic case reported from this country.

(c) The species is pathogenic to common laboratory animals.

(d) Detailed mycology shows that the colour of the growth resembles the European type species *S. beurmanni* but it differs from *S. beurmanni* in its biochemical reactions, morphology and some other points.

(e) It differs from other known pathogenic species in many respects.

(f) It is proposed to name this new species *Sporotrichum* (Rhinoeladium) *tropicale* n.sp.

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SEROLOGICAL TECHNIQUE (contd.)

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THE KAHN TEST FOR SYPHILIS

A ONE-TUBE Micro-Kahn test, specially in conjunction with the Wassermann test, is as good as the full test. It is performed as follows:—

The apparatus.—(i) Small wooden racks about 12½ inches by about 1½ inches (at the bottom) by 1½ inches, to hold 18 miniature test tubes, the bottom shelf painted black and the rest white, and the top numbered for the tubes. Each rack is also numbered. (ii) Durham's fermentation tubes measuring about 5 cm. by 8 mm. with internal diameter of 6 mm. A fermentation tube not admitting a pipette should be rejected. (iii) Antigen-suspension vials* measuring 5½ by 1½ cm. as prescribed for the regular test. (iv) A 0.1 c.c. pipette graduated to the tip in 0.01 c.c. divisions for distributing antigen dilution. A Kahn pipette graduated to the tip or a Wright's pipette calibrated with mercury may be used. The pipette is worked with a teat. (v) Thin 1.0 c.c. pipettes graduated to the tip in 0.1 c.c. divisions for distributing serum and saline. (vi) Incubator registering 37°C. (vii) A magnifying glass. Items i to vii are shown in the photograph.

* The titration of the antigen is effected as follows:—

Pipette 1 c.c. of standard sensitized antigen into an antigen suspension vial. Pipette an amount of normal saline, indicated by the titre, into a similar vial. Pour the saline into the antigen and, as rapidly as possible (without waiting to drain the vial), pour the mixture back and forth six times. Allow the antigen suspension to stand ten minutes at room temperature before using. The suspension should not be used after 30 minutes' standing.

0.7 c.c. of the antigen (minimum recommended by Kahn) diluted with the necessary quantity of saline (as indicated by the titre) suffices for about 100 tests.

Determination of the titre itself is carried out as follows (see table):—

(A) Primary suspension of antigen.

Measure 0.7, 0.9, 1.0, 1.1, 1.2 c.c. respectively of physiological salt solution into 5 standard antigen suspension vials (5.5 cm. length, 1.5 cm. diameter).

Measure into each of 5 similar vials 1 c.c. of cholesterolized antigen.

Prepare 5 antigen suspensions by mixing the 1 c.c. quantities of antigen with the varying amounts of saline in series. Empty the saline into the antigen and as rapidly as possible (with waiting to drain the tube) pour the mixture back and forth 6 times. Permit the mixture to stand for 30 minutes.

(B) Secondary suspension from primary suspension to determine dispersibility of aggregates on further dilutions of saline.

Pipette 0.05, 0.025 and 0.0125 c.c. quantities of each of the five antigen suspensions, beginning with the suspension containing the largest amount of salt solution, in series, to the bottom of a set of five series of 3 standard tubes (employed in performing the regular Kahn test with serum, 7.5 cm. length, 1 cm. diameter), using a 0.2 c.c. or 0.25 c.c. pipette marked in 0.001 or 0.0125 c.c. amounts.

The procedure.—(1) Deposit 0.01 c.c. of the antigen dilution at the bottom of the tubes. Only the bottom division of the pipette is used and the antigen dilution shaken every time before drawing it into the pipette. (Antigen dilution taken to fill a pipette and then distributed division by division will not keep a constant density throughout.) (2) Also deliver 0.1 c.c. of an inactivated (not below 55°C. or above 56°C.) and clear (no particles) serum to be tested to each corresponding tube without delay. This is best done by an assistant who follows the deliverer of the antigen. (3) Put up (i) a known positive, (ii) a known negative and (iii) the antigen control, with saline, 0.1 c.c.

rack (reflected light). The reading is also aided by a magnifying glass.

Types of reactions.—The reactions are read on a plus sign basis.

(i) Four plus reactions—definitely visible particles suspended in a clear medium.

(ii) Three plus reactions—definitely visible but less clear-cut particles suspended in a clear medium.

(iii) Two plus reactions—particles suspended in a somewhat turbid medium.

(iv) One plus reactions—very fine particles suspended in a somewhat turbid medium.

(v) Doubtful, \pm , reactions—mere granularity when compared with controls.

TABLE FOR TITRATION OF ANTIGEN

A. Primary suspensions

Tube number	..	I	II	III	IV	V
Antigen in c.c.	..	1.0	1.0	1.0	1.0	1.0
Saline in c.c.	..	0.7	0.9	1.0	1.1	1.2
Appearance of mixture		Heavy suspension of aggregates.	Heavy suspension of aggregates.	Heavy suspension of aggregates.	Heavy suspension of aggregates.	Heavy suspension of aggregates.
		Kept for 30 minutes				

B. Secondary suspension from primary suspensions to determine dispersibility

	From I			From II			From III			From IV			From V				
Tube number	..	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
Suspension in c.c.	..	0.05	0.025	0.0125	0.05	0.025	0.0125	0.05	0.025	0.0125	0.05	0.025	0.0125	0.05	0.025	0.0125	
Saline in c.c.	..	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	
		Shake for 3 minutes			Shake for 3 minutes			Shake for 3 minutes			Shake for 3 minutes			Shake for 3 minutes			
More saline in c.c.	..	1.0	0.5	0.5	1.0	0.5	0.5	1.0	0.5	0.5	1.0	0.5	0.5	1.0	0.5	0.5	
Appearance of mixture		Cloudy (visible aggregates present).			Cloudy (no visible aggregates present).			Cloudy	Opalescent (transmits images of windows across the street).		Opalescent.		These tubes give the titre, i.e. the dilution of the antigen should be as in IV (1 c.c. of the antigen + 1.1 c.c. of saline).			Opalescent.	

only, instead of serum. (4) Shake the racks vigorously for 2 minutes and place into the incubator at 37°C. (5) Remove the racks from the incubator after 15 minutes and add 0.2 c.c. saline into each tube.

The ensemble :—

Antigen dilution	..	..	0.01 c.c.
Serum	..	..	0.1 c.c.
	Shaken for 2 minutes.		
	Incubated for 15 minutes.		
Saline	..	..	0.2 c.c.

Reading of results.—Results are read by holding the rack in front of a window (refracted light) aided by holding the index finger between the light and the tube, by the lower edge of the

With a 1 c.c. pipette, add 0.15 c.c. salt solution to each of the 15 tubes.

Shake the rack of tubes vigorously for 3 minutes by hand.

Add 1 c.c. salt solution to the tubes containing the 0.05 c.c. amounts of antigen suspension, and 0.5 c.c. to the remaining tubes. Observe whether fluids are opalescent or contain aggregates.

The smallest amount of saline, which when added to 1 c.c. of antigen, produces aggregates capable of complete dispersion upon the addition of further salt solution, yielding an opalescent fluid which is not cloudy, gives the titre of the antigen.

The titre is constant and need only be checked once a month or so.

(vi) Negative reactions—not different from the antigen control except for the colour and a slight influence of the viscosity of the serum on the movement of the opalescent fluid, like the known negative control.

Interpretation of reactions.—Four plus and three plus reactions are interpreted as positive; two plus and one plus as weakly positive; and doubtful and negative reactions are classed together and regarded as negative.

(To be continued)

INTUSSUSCEPTION FOLLOWING INFOLDING OF BOWEL

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INTUSSUSCEPTION has been reported following the inversion of the appendical stump by the usual method practised in the operation of appendicectomy: the risk of its occurrence is sufficient as a reason for abandoning this

method of covering over the appendix stump. In 1943 Fraser collected four cases from the literature occurring at intervals varying between twelve days and four and half years after appendicectomy. It was the occurrence of cases such as these that led to the advocacy by many surgeons of covering the stump of the appendix with a tag of nearby fat instead of inverting it into the caecum or even of leaving it uncovered after cauterization of the exposed mucous membrane. That this complication 'must' be extremely rare is evident from the fact that so few cases have been reported out of the many thousands of operations for appendicitis performed by the 'orthodox' technique during the past fifty years.

The following case was one of intussusception originating in the inverted end of a loop of small intestine and could be placed in the same category as the above type of case :

The patient, a Hindu girl, aged 15, was admitted to the hospital on 14th September, 1945. For some fifteen months she had suffered at intervals from pains of a colicky nature beginning in the mid-abdomen and spreading to the left hypochondrium; these were associated with nausea and sometimes vomiting and were unrelated to the taking of food. One month before these attacks commenced she suffered from cholera. The duration of an attack would be 24 hours or even longer with intervals of freedom from pain lasting several weeks. For twenty days previous to admission she had been suffering from more or less continuous pain of this character.

On examination the patient appeared to be in fair general condition though clearly suffering from pain. There was slight fullness of the abdomen which moved normally on respiration. There was a visible swelling in the left upper quadrant which varied in size from time to time. There was some visible peristalsis in the upper abdomen. It was noticed that when the swelling became prominent the patient complained of colicky pain. On palpation an irregular mass could be felt above and to the left half of the transverse colon and its outline suggested a connection with this structure. Its dimensions were about six cms. from side to side by four cms. from above downwards. It could be moved slightly in all directions though it did not move with respiration. On percussion it was dull. There was no free fluid in the abdominal cavity. On auscultation very well-marked bowel sounds were heard over the upper abdomen. On rectal examination nothing abnormal was observed nor were there signs of disease in the rest of the body apart from a low haemoglobin 60 per cent (Sahli) and a high white count 21,000 cells per c.mm.

Abdominal exploration was carried out on 25th September, 1945. The mass was found to be retroperitoneal, hard and rather irregular with a loop of jejunum stretched out over it. The bowel was not invaded by the mass but

was clearly being kinked by pressure and so obstructed. The bowel and the mass were closely adherent to one another. There were some enlarged glands in the lower part of the mesentery one of which was removed for microscopical examination. The condition was thought to be tuberculous adenitis. Removal of the mass, however, was considered unpracticable and unnecessary (figure 1).

To relieve the obstructive symptoms healthy loops of bowel above and below the lesion were found and an end to side anastomosis performed (figure 2). For the anastomosis cotton sutures were used throughout and the blind end of the upper loop was serially closed by the ordinary method of two rows of continuous sero-muscular cotton sutures.

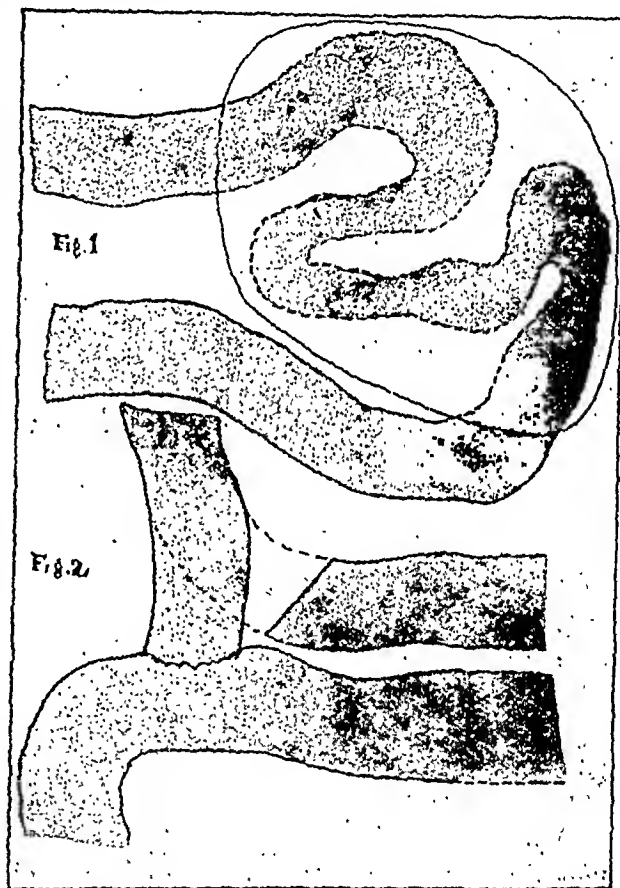


Fig. 1.—A diagrammatic representation of the small intestine showing the region obstructed.

Fig. 2.—Anastomosis of the jejunum proximal to the obstruction into the jejunum distal to the obstruction leaving a blind loop of bowel.

Convalescence was uneventful and the patient was discharged four weeks after operation.

The report on the gland was as follows : The normal structure of the gland is almost completely obliterated by an increase of small round cells resembling lymphocytes. A few proliferating germinal centres are visible here and there but the sinusoids cannot be made out. There is no caseation; no foci of epithelioid cells are seen, so that the condition does not appear to

be tuberculous. The cell picture is too uniform for Hodgkin's. On the whole the section suggests a non-specific chronic inflammatory reaction rather than neoplasia.

The patient was re-admitted on 18th January, 1946, with abdominal pain of 15 days' duration. The pain was severe, colicky in nature, and came on in frequent attacks every day. She said that she felt a lump moving about in the abdomen and described the pain as beginning in the left upper abdomen and moving to the right parts.

The patient's general condition was very poor. She was emaciated and dehydrated and was clearly suffering much pain. The abdomen showed general rigidity and tenderness and there was a mass 5×4 cms. in the region of the abdominal scar (*R. paramedium*). An examination by a barium meal was made at once. This showed delay in the passage of the barium meal through a dilated loop of jejunum which was situated about one foot from the beginning of the jejunum. There was very active peristalsis over this dilated loop. After a short delay the meal passed on. No displacement by a mass was found at this examination. Impression from this examination was partial obstruction in a dilated upper jejunal loop.

As there was no evidence of complete obstruction and as the patient's condition was far from suitable for operation the abdomen was not re-opened but an attempt made to relieve her symptoms and restore her nutrition by non-operative means. Her condition, however, deteriorated and she died twelve days after admission.

The autopsy was performed ten hours after death. The subject was a wasted and poorly developed girl. There was marked generalized dermatitis from scabies.

On opening the peritoneal cavity some sero-purulent fluid was encountered. The duodenum was distended as were also the first 12 cms. of the jejunum at the end of which the anastomosis had been performed. There was an adequate stoma and a well-healed anastomosis which had an adequate opening between the loops of bowel. The blind loop of bowel left at operation was found to extend to the left from this anastomotic site as a sausage-shaped swelling. The end of this loop showed an invagination of the bowel and mesentery resembling an intussusception (figure 3). When this loop was opened it was found to contain intussuscepted bowel and mesentery. The apex of the intussusception had reached the anastomotic site and was projecting into the bowel just beyond producing obstruction. When the apex was incised the cotton suture used for the purse string to infold the bowel at operation was discovered. Thus the apex of the intussusception was the place at which the closed end of bowel had been invaginated. This must have produced a small projection which proved to be the commencement of the intussusception (figure 4).

The base of the intussusception was beginning to become gangrenous and there was one area of ulceration on the peritoneal surface. The omentum was adherent to this region and was inflamed and gangrenous. There was a long



Fig. 3.—The condition as found at post mortem. A. The intussuscepted bowel from outside. B. Anastomotic site.

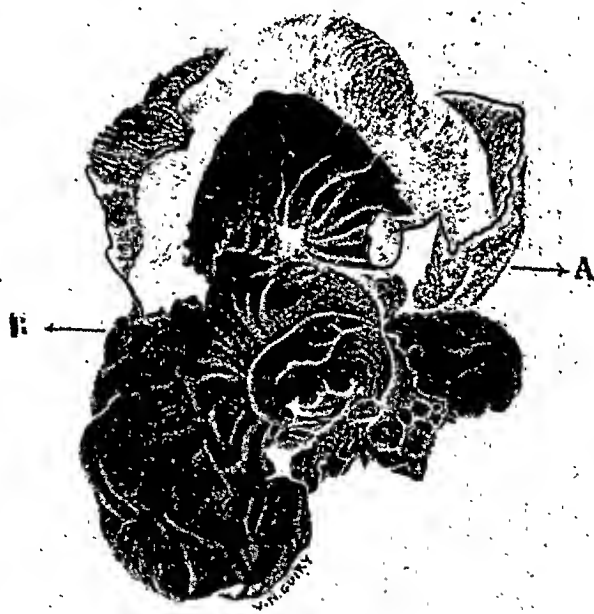


Fig. 4

Fig. 4.—The appearance when the blind loop of bowel was opened to show gangrenous intussuscepted bowel and mesentery. B. The anastomotic site at which point the intussuscepted bowel was obstructing the lumen.

adhesion formed from omentum stretching from this site down to the right iliac fossa. There was some dilatation of the upper part of the small intestine but the peritoneum was shiny and there was no evidence of generalized peritonitis. In spite of a very careful search no evidence was found of the mass found at the

first operation. The bowel was not freely movable but was bound down to the posterior abdominal wall.

The spleen was adherent to the stomach over most of its gastric surface and there was a small amount of yellowish pus in this region.

The right lung was firmly adherent to the chest wall by old white adhesions between visceral and parietal pleuræ which were difficult to separate. In this separation some of the superficial part of the lung remained adherent to the chest wall. On the left side the adhesions were not so marked and were mainly seen at the base of the lung. On section the lungs were seen to be markedly anthracotic with enlarged anthracotic glands at the bifurcation of the trachea and on either side of the trachea itself. Both lungs were red and crepitant with no areas of consolidation.

Examination of the intussusception microscopically failed to reveal any areas of tubercular infection.

Comment.—The extensive pulmonary adhesions in a girl of 15 suggest the possibility of a tuberculous pleurisy. Anthracosis is commonly seen in India due to the very smoky kitchens in most homes. The mass found at operation could not be identified macroscopically or microscopically. Explanations that can be offered are that the rest resulting from short circuiting allowed resolution to take place in a tuberculous mesenteric gland or that complete degeneration had resulted from necrosis accompanying the intussusception; that the attack of cholera preceding the development of the signs of obstruction may have left a residual glandular mass is a further conjecture.

In connection with the subject of intussusception from invaginated bowel the following case is of interest as suggesting intussusception occurring several years following appendicectomy although absolute proof is lacking. For these notes we are indebted to Dr. H. M. Lazarus (Lieut.-Colonel, I.M.S.) who performed the second operation.

The patient was an Anglo-Indian woman, aged 49, who had had her appendix removed in 1926. Ten years later she was admitted to hospital complaining of epigastric pain, vomiting and the passage of blood and mucus in the stools for eight days. Her temperature varied between 99° and 101°. Repeated examination of the stools showed many red blood cells and a number of pus cells but no amœbæ or cysts. Abdominal examination showed a flabby abdomen with visible peristalsis extending across the abdomen and down to the sigmoid region. There was a sausage-shaped swelling extending from right to left along the line of the ascending transverse and descending colons as far as the sigmoid region palpable during spasms. Rectal examination showed a bulging in the pouch of Douglas.

At operation there was found an intussusception, the apex of which reached to the rectum.

This was easily reduced by pushing the apex backwards. The colour and blood supply of the bowel were normal. The intussusception had begun in the cæcum where there was some thickening of one of the tæniæ.

These two cases serve to indicate the definite possibility of invagination of the appendix stump or a blind loop of bowel being the starting point for an intussusception.

We are indebted to Dr. Ida B. Scudder for the x-ray report, to Dr. Agatha Crawford for the report on the gland, to Dr. Hilda Lazarus for her case notes and to Mr. Guiry for his drawings.

REFERENCE

FRASER, K. (1943) .. *Brit. J. Surg.*, 31, 23.

A Mirror of Hospital Practice

A CASE OF INIENCEPHALIC MONSTER

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A FULL-TERM female foetus (figure 1, plate VIII), the vertical length of trunk and head 15.2 cm.; anal, vaginal and urethric openings present on the external surface; no groove of neck seen from front or from behind, the skin passing straight down from the chin to the thorax, and from the back of the head to the back of the trunk. On the posterior aspect the hair of the head extended down to a point 5.5 cm. above the rump. Ears well developed, and situated in their normal position. No visible spina bifida on the surface. Large omphalocele 6 cm. × 5 cm. at the skin margin. The umbilical cord attached to the left side of the sac of the omphalocele. Both the feet showed talipes. The mouth pointed almost directly upwards, and the bregma pointed backwards and upwards.

A sagittal section was made (figure 2, plate VIII). It passed to the left of the middle line. The fusion of the occipital region to the back extended to the upper lumbar region. The foramen magnum was larger than usual and measured 2.6 cm. anteroposteriorly. The basi occiput was running vertically down. The cervical and the thoracic regions of the spine were making an acute curve with the concavity posteriorly. The sacral and the lumbar regions of the spine were closed, and pedicles and lamina had developed in these regions, but the spine of the cervical and the thoracic regions was open from behind and the laminae had not developed in these regions. There were fewer segments in the cervico-thoracic part of the spine than in a normal individual.

Though the foramen magnum and the cavity of the subarachnoid space in the cervical region were larger than normal, no part of the brain was situated below the foramen magnum. In the cervical part of the spinal cord the central

PLATE VII

SOME OBSERVATIONS REGARDING THE TOXICITY OF THIAMIN CHLORIDE AND NICOTINIC ACID : S. H. ZAIDI. (O. A.) PAGE 181

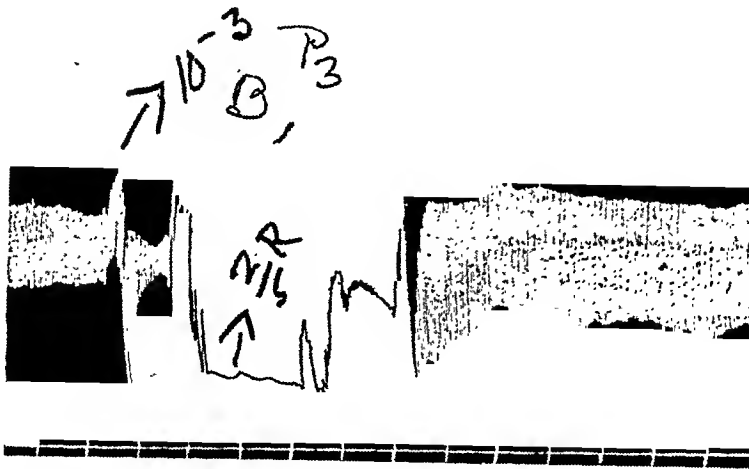


Fig. 1.—Composition of perfusing solution 2/5R—0.6 per cent NaCl, 0.03 per cent KCl, 0.01 per cent NaHCO_3 , 0.01 per cent CaCl_2 .
At $\rightarrow 10^{-3}\text{B}$, thiamin chloride one part in one thousand of Ringer's solution perfused.
At $\rightarrow 2/5\text{R}$ Ringer's solution alone began to be perfused.
 P_s = minimum acidity as shown by B.D.H. Universal indicator.
Time in half minutes.

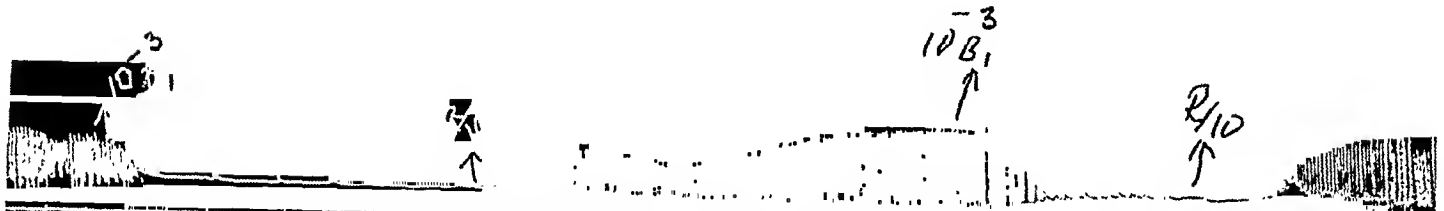


Fig. 2.—Composition of perfusing solution R/10—0.6 per cent NaCl, 0.03 per cent KCl, 0.01 per cent NaHCO_3 , 0.0025 per cent CaCl_2 .
At $\rightarrow 10^{-3}\text{B}$, thiamin chloride one part in one thousand of Ringer's solution perfused.
At $\rightarrow \text{R}/10$ Ringer's solution alone reperfused.

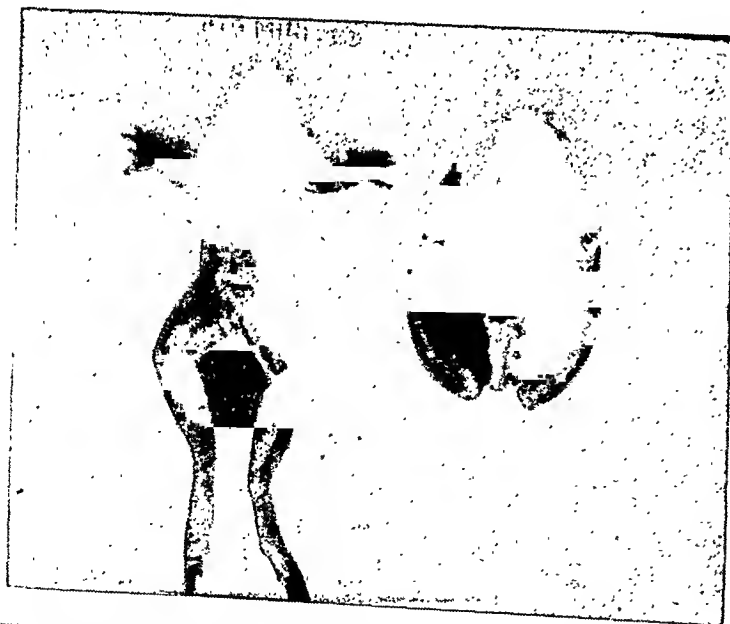


Fig. 3.—To 'control' frog was given 1 c.c. of sterile distilled water subcutaneously.
To 'thiaminized' frog 100 mg. of thiamin chloride dissolved in sterile distilled water given subcutaneously in the abdomen.
Photograph taken after 20 minutes. The 'thiaminized' frog became dull and listless, the limbs were extended and the reflexes lost.



Fig. 4.—A photograph of a preserved specimen in the museum showing the enormously dilated stomach and portions of large intestines as a result of perfusion of heart with thiamin chloride (see text).

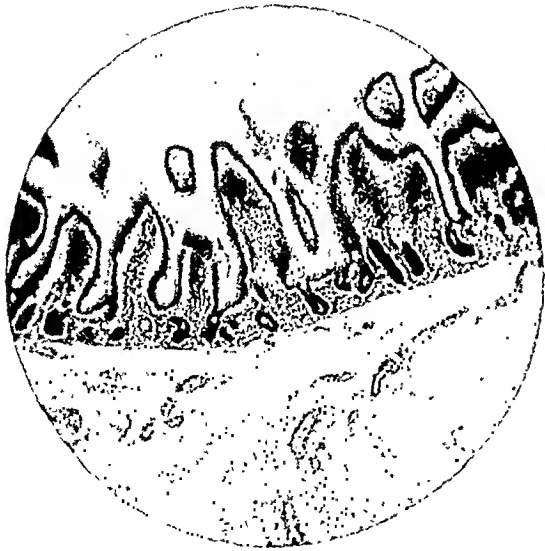


Fig. 1.—Stomach cardia ($\times 70$).

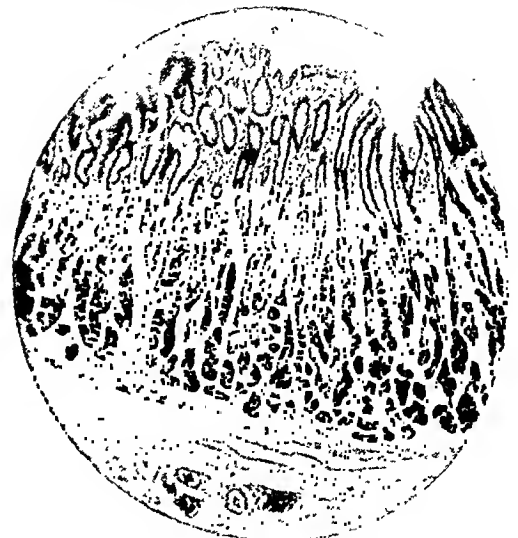


Fig. 3.—Stomach pylorus ($\times 70$).



Fig. 2.—Stomach fundus ($\times 70$).

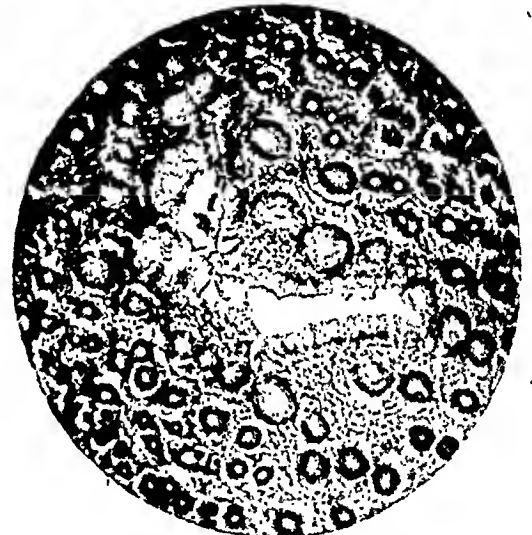


Fig. 4.—Stomach : to show the islet of intestinal epithelium ($\times 200$).



Fig. 1.



Fig. 2.

canal was open from behind and the cord itself was transversely broadened so that the open spinal canal resembled the fourth ventricle. The open canal was actually directly continuous with the cavity of the fourth ventricle above. The open upper part of the cord was closely following the curve of the cervico-thoracic curve of the canal. The lateral margins of the open part of the spinal cord were formed by thick vertical bands which were continuous with the posterior columns of the cord lower down. In the lower part of the open portion there was a transversely elongated, slightly pedunculated mass about 9 mm. in transverse diameter. Immediately in front of the bands mentioned above as forming the lateral margins of the open part of the spinal cord was a groove from which the nerve roots were emerging. That this open part was not the medulla oblongata itself was shown by the facts that normal medulla oblongata with pyramids and olive was present at the level of the cerebellum above the level of the foramen magnum, and the nerve roots that emerged from this part were emerging out between the cervical and thoracic vertebræ, thus showing definitely that this part was really the cord and not the medulla oblongata. The cavity of this open portion of the cord was continuous with the cavity of the fourth ventricle above and with the central canal of the cord below. In the mid-sagittal plane on the posterior aspect of the body of the vertebræ, opposite the transverse mass in the open part of the cord, was a small spine about 1 or 1.5 mm. projecting backwards towards the spinal cord. The lumbosacral region was normal and the spinal canal was closed.

The palatine processes corresponding to the premaxillary part had fused together in the middle line and with the nasal septum, but behind that portion there was cleft palate affecting the bony as well as the soft palate. The palatine processes had developed, but they had not fused in the middle line in the posterior part, leaving the cavity of the mouth in free communication with the nasal cavities. The nasal septum was well developed with its free inferior border opposite the cleft in the palate.

Both the kidneys were situated at a higher level and were projecting in the thoracic cavity through defects in the corresponding sides of the diaphragm. The crura of the diaphragm on each side of the aortic opening had developed and the defects above mentioned were on right and the left side of the corresponding crus. The whole of the liver and the spleen were in the sac of the omphalocele.

Iniencephaly was first described and named by Isidore G. Saint Hilaire who described the abnormality as very rare. The three chief characteristics of iniencephaly are retroflexion or backward bending of the spine, the spina bifida and large foramen magnum due to imperfect formation of the occiput in the

neighbourhood of the foramen magnum. There may be other associated abnormalities.

My thanks are due to Dr. K. M. Masani, M.D., F.R.C.S., chief medical officer, Wadia Maternity Hospital, Bombay, for lending me the specimen of dissection.

HERPES ZOSTER : TWO CASE STUDIES

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Case no. 1.—J. A., a young man, aged 19 years, otherwise in perfect health, experienced pain in the neck and left shoulder on or about the 9th September, 1946. He attributed it to a chill and some physician prescribed two aspirin tablets to be taken during the day. For 3 days in spite of the aspirins the pain did not subside. On the 4th day of the illness on careful examination no cause could be found for the pain, but on the 5th day on the left side of the neck just below the left ear two typically herpetic eruptions were noticed. The herpes soon spread to the neck below the ear and also on the face in front of left ear and a few vesicles appeared in the supra-clavicular region. On the appearance of the rash the intensity of pain was considerably relieved. Three days after the appearance of the rash the patient developed left facial paralysis (Bell). The eruptions also extended to the left occipital region.

The facial paralysis persisted. At the time of writing (20th January, 1947), i.e. after a lapse of 4½ months, it has just disappeared except that the left angle of the mouth is slightly drawn upwards and to the left when the patient smiles. The left eye could not be closed completely for about 2 to 3 months after the onset of paralysis.

Treatment.—Pituitrin 1 c.c. (intramuscularly) daily with local application of zinc-starch and boracic powder were resorted to. Only 6 c.c. of pituitrin were administered. The patient also received Berin injections 1 c.c. subcutaneously for about 10 days. Beyond that no other treatment was adopted. The general health of the patient was not much affected.

Case no. 2.—N. D., a robust and healthy male, aged 60 years, suddenly developed acute conjunctivitis in the right eye during the middle of November 1946. This seemed rather unusual in a person of a very clean habits with no case of acute conjunctivitis around. The left eye was totally unaffected. After three or four days of treatment with frequent saline *cum* boracic washes, and 10 per cent argyrol lotion locally, no improvement was noticeable. On the 5th day a rash appeared on the right forehead and it was typically herpetic in character. Herpes zoster of supra-orbital branch of the trigeminal nerve was diagnosed. The cornea was at once examined, and by use of fluorescein, a marginal ulceration was noticed at 6 o'clock. Immediately treatment with sulphathiazole by mouth (2 to

3 grammes daily) and homatropine ointment in the eye (after due regard for the tension) was adopted. Pituitrin 1 c.c. daily was given intramuscularly for 3 or 4 days. Sulphathiazole treatment was stopped after about 6 days as progress of the ulceration was checked. The rash started drying up after a week.

The inflammation of the eye cleared up after about 2 weeks, but the vision did not return to normal till after 20 to 25 days.

Discussion

1. Two unusual cases of herpes zoster have been described. Both are unusual in view of development of facial paralysis in one and involvement of cornea in the other.

2. In the case of supra-orbital herpes, a case of chicken pox had occurred in the family some 3 weeks prior to the onset of disease in this case. The relationship of the causative virus of chicken pox and herpes zoster is admitted in many quarters and this case seems to provide a further proof of the close association of the two.

3. Pituitrin therapy does not seem to be of much benefit, and since no immediate results were obtainable, the treatment with this biological product was cut short after certain number of injections.

4. Collodion flexile was not tried as a protective for the eruptions as in many cases it has been observed to cause great inconvenience to the patient.

5. Ordinary bland dusting powder seemed good enough for the eruptions.

A CASE OF DERMATOMYOSITIS

By L. M. GHOSH

and

B. K. SEN

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D. G., A TEN-YEAR-OLD Bengali girl, was admitted on 29th May, 1946, with the history of intermittent low pyrexia every evening, progressive weakness and a number of gradually extending skin lesions (see figure, plate X).

History.—About a year ago, she was suddenly attacked with fever followed by the appearance of a small erythematous patch on the left thigh. In course of time similar other lesions developed on other parts of the body one after the other. Later, the skin over some of the affected areas became adherent to the underlying subcutaneous tissue. In the sixth month of her illness she had a course of sulphanilamide with no effect.

Family history.—Nothing particular.

Physical examination on admission.—Patient appeared poorly nourished. Spleen—soft, enlarged almost down to the level of the umbilicus. Other organs—normal.

Cutaneous lesions.—Raised erythematous annular ridges enclosing slightly depigmented and atrophied areas. The lesions were not itchy but painful in certain places. The skin over some of the affected areas, specially the left elbow, was adherent to the underlying subcutaneous tissue.

Sites of the lesions.—Primary site—left thigh, oval with 4 inches longest diameter. Other sites—forehead, a semi-lunar area 3 inches in diameter; chest, round 7 inches in diameter; back, rectangular—6 inches \times 5 inches; arms, from near the shoulder joints to the elbows, the outer surfaces affected more than the inner.

Laboratory findings :—

Urine analysis—faint trace of albumen present, otherwise normal. *Urine culture*—sterile. *Urine creatinine*—1.3 gm. (in 24 hours). *Stool*—normal.

Blood count :—

Erythrocytes	.. 2,960,000 per c.mm.
W.B.C.	.. 3,100 per c.mm.
Poly.	.. 56 per cent
Lympho.	.. 34 " "
L. mono.	.. 8 " "
Eosino.	.. 2 " "
Hb.	.. 10.5 gm. per 100 c.c.
M.P.	.. Negative
Antimony test	.. "
Aldehyde test	.. "
C.F. test for K.A.	.. "
van den Bergh reaction	.. "
W.R.	.. "
Kahn test	.. "

Agglutination against enteric group of organisms—negative. *Blood culture*—sterile.

Blood chemistry :—

Uric acid	.. 0.003 per cent
Cholesterol	.. 0.145 " "
Sugar	.. 0.105 " "
Gastric analysis	.. Pseudoachlorhydria
Mantoux test	.. Negative
Skiagram of chest	.. No abnormality
Sedimentation rate :	
Observed	.. 57.5
Corrected	.. 42

Blood counts and estimation of creatinine in blood and urine carried out at intervals during her stay in the hospital :—

12th June	
Erythrocytes	.. 4,150,000 per c.mm.
W.B.C.	.. 4,300 per c.mm.
Poly.	.. 59 per cent
Lympho.	.. 34 " "
L. mono.	.. 5 " "
Eosino.	.. 2 " "
Blood creatinine	.. .0019 gm. per cent
Urine creatinine	.. .08 gm. per cent
24th July	
Erythrocytes	.. 3,990,000 per c.mm.
W.B.C.	.. 4,600 per c.mm.

26th July		
Urine creatinine	..	0.0261 gm. per cent
31st July		
W.B.C.	..	5,560 per c.mm.
Poly.	..	60 per cent
Lympho.	..	30 " "
L. mono.	..	7 " "
Eosino.	..	3 " "
2nd August		
Blood creatinine	..	0.0030 gm. per cent
Urine creatinine	..	0.06 gm. per cent
10th August		
Blood creatinine	..	0.0036 gm. per cent
Urine creatinine	..	0.05 gm. per cent

Creatinuria is said to be one of the features of this condition but in this case there was no marked increase in the creatinine excretion nor any appreciable increase in the creatinine content of the blood.

Histopathology (Major K. Banerjee)—

Epidermis.—Moderate thickening of the horny layer which is partially detached here and there. Surface shows formation of crusts composed of dried up fibrin, R.B.C. in fairly large numbers and leucocytes. Stratum lucidum indistinct. Rete mucosum slightly hyperplastic. Basal cells contain fairly dense charge of melanin pigment which shows normal drift towards surface.

Corium.—Both pars papillaris and pars reticularis show fairly well-marked oedema and increase of fibrous tissue at the expense of normal soft collagen bundles. The papillary and sub-papillary plexuses are dilated, their endothelial cell wall shows appreciable swelling. Only scanty perivascular lymphocytic infiltration is noticed. Sebaceous glands and hair follicles are destroyed, coil glands are more or less intact, although a few show pressure distortion and commencing atrophy.

Subcutaneous tissue.—The interstitial tissue of the panniculus adiposus is densely infiltrated with small lymphocytes, plasma cells and histiocytes—all the blood vessels and capillaries are markedly dilated, the adventitia of the larger vessels show lymphocytic infiltration. The fat cells appear much larger than normal—their nuclei retain normal morphology. Groups of histiocytes are permeating along lymphatic spaces; there are no fibroblasts along these tracts of permeation indicating a condition of histophagy without formative fibrosis. The spread of cellular infiltration seems to be limited superficially by a thick band of fibro-collagenous tissue originating from the pars reticularis—a few multi-nucleated connective tissue cells are found lying free in the matrix substance. Irregular foci of fat necrosis are also to be seen. Deep fascia is somewhat oedematous—blood vessels are dilated, some of the veins contain thrombi while a few small clusters of histiocytes in the lumen. Scanty lymphocytic infiltration of the adventitia is evident in this region as well.

Changes in muscles.—All the muscles show advanced stage of degeneration of the entire bundles—the fibrils have lost their striations and nuclei as well in most instances—there is complete resorption; interstitial oedema of considerable degree and focal hæmorrhage without any evidence of infiltration with lymphocytes or histiocytes. Sarcolemma is very indistinct—the sarcoplasm is inclined to be basophilic. In some areas a diffuse patch of hæmorrhage represents the remnant of a muscle bundle.

Oblique tangential section of some of the less affected bundles shows thickening of the sarcolemma, well-marked interstitial oedema and duplication of nuclei.

Histo diagnosis.—Dermatomyositis (polymyositis).

Abnormal feature.—Dense cellular infiltration of the subcutaneous tissue.

Course in the hospital.—The patient was getting a daily rise of temperature in the evening, the maximum being 101°F. She was put on mixed diet consisting mainly of eggs, butter, bread, vegetables, milk, fish, orange and rice, and adexolin 10 drops twice daily. After about two weeks there was a little remission in the fever, the highest being 99°F. and the patient gained in weight but the skin lesions and the spleen underwent no change. Ten days after, the temperature started going up again and the patient was put on 5 grains of quinine sulph twice daily for four days, but with no effect. This was followed by penicillin injections intramuscularly 10,000 units every four hours up to 500,000 units without any effect. Walking short distances used to make her feel better, but there was no change in the temperature or the skin condition. She was then given intramuscular injections of milk every fourth day, beginning from 1 c.cm. and increasing every time by 1 c.cm. up to eight such injections. There was slight improvement in the temperature, skin lesions and the spleen. At this stage the patient went away from the hospital and since then there is no report about her.

The case is diagnosed as one of Dermatomyositis on the basis of histological findings although the clinical features do not conform to the classical description in standard works.

Therapeutic Notes

NOTES ON SOME REMEDIES

VIII. AMOEBCIDES

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IPECACUANHA root was long used in Brazil as a remedy for dysentery and first brought to Europe nearly three centuries ago by Piso who had discovered its value during his tour of

exploration in that country. It was sold to the French Government as a secret remedy and after the successful treatment of Louis XIV its use became more general. It rose in popularity in the nineteenth century. At first small doses were used, later one dram doses were introduced. Leonard Rogers was the first to try injection of emetine, one of its alkaloids, and the results were spectacular. Although it has its limitations, emetine is still the basis of treatment of amœbic dysentery and its dangerous complications, hepatitis and hepatic abscess, but since then many other drugs and combination of drugs have been introduced, some containing emetine and others of a totally different nature, and these are used chiefly as supplementary to emetine. These drugs may be divided into five groups, the best known being as follows :—

- I. *Compounds of emetine*—
Emetine hydrochloride
 " bismuth iodide
 " periodide
Auremetine
- II. *Organic arsenicals*—
Carbarsone
Stovarsol (acetarsol)
- III. *Oxyquinoline derivatives*—
Chiniofon
Vioform
Diodoquin
- IV. *Chemotherapeutic agents*—
Penicillin
Sulphonamides
- V. *Miscellaneous*—
Kurchi
Bismuth salts

A brief description of the uses of these drugs is given below :—

I. *Emetine and its compounds*

1. *Emetine hydrochloride*.—In the human body emetine is rapidly absorbed when given by injection and acts on the amœbæ lying in the tissues of the intestine and of organs such as the liver, but although it is partly excreted by the gastro-intestinal tract, the amount is not sufficient to have any appreciable action on the amœbæ and the cysts lying in the lumen of the bowel. Excretion also takes place through kidneys, but this occurs irregularly and only in fractional amounts. Actually it accumulates in the body and may take several weeks to pass out of the body after a course of treatment is completed.

The dose of emetine hydrochloride is $\frac{1}{2}$ to 1 grain. The total dosage is calculated at 1 grain per stone body weight but in an average Indian patient it should not exceed 9 or 10 grains in one course. It is an advantage to give it in two parts with an interval in between, particularly in weak patients in order to diminish the toxic effects of cumulation. Thus to a patient

weighing 9 stones, a total dosage of 9 grains is given, of which 6 grains may be given in the first six days, and the remainder after three days in 1 or $\frac{1}{2}$ grain doses. There is no therapeutic advantage by giving heroic or protracted dosage which tends to poison the patient without any corresponding effect on the disease itself.

It is a common practice to give emetine injections subcutaneously but this may cause irritation and painful indurations persisting for long periods and even cellulitis. These disagreeable sequelæ may be obviated by intramuscular or deep subcutaneous injections. It should not be injected intravenously. As it is liable to cause toxic effects the patient should be at rest when undergoing treatment; a second course of emetine, if at all necessary, should not be given until after the lapse of a few weeks.

2. *Emetine bismuth iodide (E.B.I.)*.—This compound contains approximately one grain of emetine in every three grains and is given by mouth and is specially indicated in chronic cases. It is an almost insoluble powder from which the emetine is set free by contact with the intestinal juices, and it is therefore important that such contact should in no way be prevented by giving it in hard or compressed tablets, or made up with insoluble substances, such as vaseline, stearin or keratin. It is best given in powder form in gelatine capsules (slipules), but as these capsules tend to harden with time and become insoluble they should be pricked with pin before being administered. The dose is one grain on the first night and subsequently 2 grains, and is given at night, say about 10 p.m., four hours after a light meal. For women and delicate individuals the dose should be gradually increased. The patient should be in bed and resting quietly. There is a tendency to vomiting though a certain amount of tolerance to the drug develops later. This vomiting is to be expected and only shows that the drug is being absorbed. The patient should endeavour to sleep and the saliva should be wiped from the mouth or expectorated and not swallowed. If nausea and vomiting are troublesome, it is necessary to give 15 minims of tincture of opium or phenobarbitone 1 grain half an hour before each dose. The drug also causes some diarrhœa about midway or a little later in the course which lasts ten days, this is beneficial as thereby it comes in better contact with the amœbic cysts which live on the mucous membrane of the bowel and which are not affected by hypodermic emetine. Towards the end of the course depression and general weakness are noticed, there is some loss in weight and the blood pressure tends to fall. But the treatment should not be stopped or shortened unless severe prostration or cardiac depression supervenes. When the course is completed, the patient quickly recovers, but he should be gradually permitted to resume work.

E.B.I. is a very effective drug especially if combined with chiniofon enemas, but it must not be given in a form in which it is not absorbed. Its drawbacks are the nausea and vomiting which it causes.

3. *Emetine periodide*.—Its action is similar to E.B.I. but it is less toxic though not so effective. It is given in 3-grain capsules combined with capsules of dried ox-bile 5 grains which facilitate liberation of emetine. This drug is to be preferred for those who cannot tolerate E.B.I.

4. *Auremetine*.—It is a combination of emetine with the aniline dye, auramine. It causes some nausea but hardly any vomiting. The dose, 1 grain in gelatine capsule, is given four times daily on alternate days, usually combined, on other days, with stovarsol by mouth and chiniofon enemas, the whole course of treatment lasting 21 days.

II. Organic arsenicals

These act against the amœbæ whether they are in the tissues of the intestine or in its contents, but are mainly used to supplement the action of emetine. They should not be administered to patients in whom liver, kidney or retinal damage is suspected. *4 Bae -102.*

1. *Carbarsone*.—Next to emetine, it has perhaps the strongest action against *E. histolytica*. Mateer *et al.* (1941) state that carbarsone is the 'most effective amœbicidal drug now known.' From a study of the effects of various drugs (except yatren enemas and other iodine preparations) used singly in a large series of chronic amœbiasis Chaudhuri and Rai Chaudhuri (1946) found that carbarsone had the best action. Better results are obtained when combined with chiniofon enema. A dose of 0.25 gm. (4 gr.) in capsule is given twice daily for 10 days after food. As it is relatively non-toxic it can be repeated after ten days' rest.

2. *Stovarsol (acetarsol)*.—It has been widely used in amœbic dysentery, but its action by itself is weak. Its special indication is in the aftercare of amœbiasis. The usual course is one tablet of 4 grains each night and morning for 10 days. It is liable to produce toxic symptoms and has now been largely replaced by carbarsone.

Both stovarsol and carbarsone can be administered per rectum in the form of retention enemas of 2 gm. in 200 c.c. of warm 2 per cent sodium bicarbonate solution after a preliminary cleansing enema. Sodium amytal, 3 grains, is previously given by mouth to ensure sleep and facilitate retention of the enema. The drugs should not be given at the same time by mouth and rectum.

III. Oxyquinoline derivatives

These are combinations of oxyquinoline sulphonic acid and varying proportions of iodine.

They are efficient amœbicides, but being incompletely absorbed from the intestinal tract, have not much action on the amœbæ in the tissues of the intestine.

1. *Chiniofon* (also known as *yatren*, *quinoxyl*, *anayodin* and *quinosulphan*).—This is the oldest of the three drugs of the group and contains 27 per cent of iodine. It is given by the mouth, by retention enemas or by both at the same time. By the first route the daily dose is 4 grains, either in powder form in capsule or as keratine coated pills, given 3 or 4 times a day after meals for 10 days. It tends to cause diarrhoea and this according to Knowles appears to exert a beneficial action.

But chiniofon is more effective when given by rectum. When combined with E.B.I., as it often is, it is best given in the morning, otherwise at night. The lower bowel is first washed out and cleared of mucus with a pint of 2 per cent sodium bicarbonate enema. One hour later 'the chiniofon retention enemas (2½ per cent solution in 7 oz. warm water) should be slowly run into the rectum with a no. 10 rubber catheter with the patient lying on his left side; when the solution has entered the rectum he should turn on his back for half an hour, and then on his right side, so as to facilitate percolation throughout the large intestine. The abdomen should be massaged anti-clockwise. The foot of the bed should be raised about a foot on blocks. Most patients can retain the solution for 8 hours' (Manson-Bahr, 1944). The treatment is given for ten consecutive days.

2. *Vioform or enterovioform*.—This drug differs from chiniofon in containing chlorine and considerably more iodine (38 per cent). It is given in gelatine capsules each containing 0.25 gm. (4 grains) of the powder, three times daily for 10 days, and can be repeated at ten-day intervals. It is contra-indicated if there is liver involvement.

3. *Diodoquin*.—This drug, much used in the U. S. A., seems to be only slightly toxic despite its high iodine content (64 per cent). The standard dosage is three tablets, 3.2 grains each, three times a day for 20 days. It does not produce the unpleasant purgation often experienced with the use of the other oxyquinoline derivatives when given orally. Morton (1945) found it very useful in cases in which, owing to inadequate treatment consisting of repeated courses of emetine injections, the entamœbæ appeared to have become temporarily emetine-fast. It is useful for the treatment of cyst passers and can be given concurrently with emetine injections in cases of amœbic hepatitis.

IV. Chemotherapeutic agents

In chronic cases secondary bacteria gain access to the bowel wall through the ulcerated mucosa and play a large part in rendering standard treatment inefficient. In several such

cases penicillin has been found to be remarkably effective. To combat some of the organisms which are not sensitive to penicillin a course of sulphasuxidine is also given concurrently by mouth; this sulphonamide is chosen owing to its low absorption and high concentration in the intestine. Both drugs have no effect on the amœbæ but make them more amenable to emetine and other specific drugs. Coghill (1945) suggests that they should be given in all cases of amœbic dysentery, fresh or old, on the suspicion that secondary infection has taken place and that they should be administered concurrently with emetine as well as before it. Their dosage and methods of administration will be given later.

V. Miscellaneous

1. *Kurchi and derivatives*: (a) *Kurchi bark* (containing an alkaloid, *conessine*).—Sixty grains of the bark in the form of tablets of 1 to 2 drachms of the extract are given orally every day for a lengthy period as an after-treatment in chronic cases.

(b) *Kurchi bismuth iodide* (K.B.I.).—It contains the total alkaloids of the bark and is given in doses of 10 grains twice daily for 10 to 20 days, preceded half an hour before by a mixture containing $\frac{1}{2}$ drachm of sodium bicarbonate and sodium citrate each.

Kurchi is a non-toxic drug and has been known to control the symptoms and keep the patient in good health when other drugs have failed. In an analysis of the results of treatment with various drugs Knowles *et al.* (1928) found the ratio of probable cures to failures from kurchi as 1:1.1 in a series of 16 cases while Chaudhuri and Rai Chaudhuri (1946) found still better results (1:0.8) in a large series of 188 cases. But in the last war reports on this drug have been unfavourable. However, as Chopra (1936) pointed out, these discordant results may be due as far as kurchi-bismuth-iodide is concerned to (1) faulty procedure in the extraction of the alkaloids and (2) use of immature, improperly collected and imperfectly dried bark. So before condemning the drug it is worth enquiring into these details.

2. *Bismuth*.—The subnitrate or the oxycarbonate in large doses has been advocated by some clinicians. It has a low amœbicidal activity and to-day its use is confined more for symptomatic relief, *e.g.* excessive frequency of stool than for any specific action against the infection. It may also be used during convalescence if the diarrhoea persists.

Toxic effects

In large doses, more than 1 grain a day, emetine has a general toxic action on the tissues, with a special affinity for the heart, and may cause unpleasant and serious symptoms such as nausea and vomiting, depression and debility, cardiac weakness and irregularity, and

fall of blood pressure. It is specially toxic to women and children. Sometimes the diarrhoea actually increases. Degenerative changes appear in the heart after excessive doses, and hence are more commonly seen in relapsed cases who have had previous courses. Formerly, these untoward effects were put down to the disease itself, and a diagnosis of post-dysenteric heart failure or weakness was not uncommon. It is probable that personal idiosyncrasy plays a part in some cases. In rare cases emetine leads to myositis and even neuritis which may produce partial paralysis. Manson-Bahr (1945) has seen atrophy of scapulo-humeral group of muscles, resembling chronic poliomyelitis. Sometimes emetine has curious effects on the nails, causing ridging and great enlargement of the lunule. The myocardial damage may be missed if the pulse is examined only when the patient is at rest; a little exercise, even the erect position alone, may quicken up the rate enormously. Mild cases clear up in a few weeks, but in others the symptoms may persist for months or even longer. But on the whole its employment is not dangerous provided the patient is kept in bed and heroic doses and repeated courses are avoided.

Arsenicals.—The toxic effects may appear in the form of abdominal distress, nausea and vomiting. Stovarsol may give rise to erythema with pyrexia and even to exfoliative dermatitis. A delayed papular rash has sometimes appeared two or three weeks after the administration of the drug. Carbarsone is a much safer drug. These drugs should be withdrawn in patients who experience gastro-intestinal irritation, visual disturbances, jaundice and skin eruptions.

Oxyquinoline derivatives.—Toxic symptoms are much less common with these drugs except occasional abdominal pain, diarrhoea and headache. Podoquin has caused pruritis ani in a few cases.

(To be concluded)

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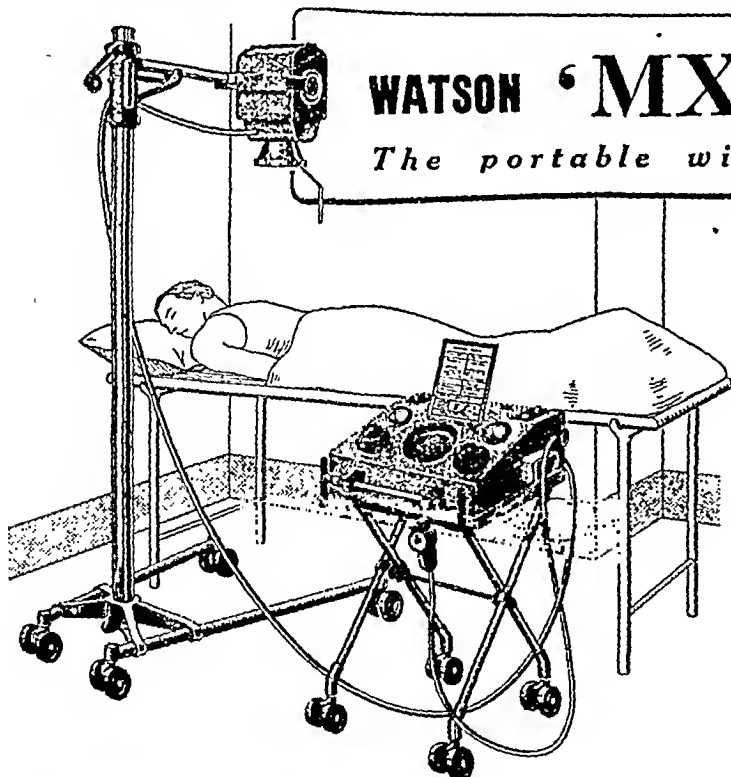
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Indian Medical Gazette

APRIL

HOMOLOGOUS SERUM JAUNDICE

THE identity of this disease has been established during the last 10 years. The term homologous applied to the serum indicates merely that it is derived from the same species. There is no suggestion in it of its isohæmagglutinin content. *Iso*serum would be better than *homologous* serum.

(The term homologous itself, applied to a *specific* serum in immunology, is not used in the correct biological sense. The wing of a bat or even the wing of a bird is *homologous* to the arm of a man. The clitoris is homologous to the glans penis. The wing of a bird, on the other hand, is only *analogous* to the wing of a housefly. Homology is an affinity between developmentally related structures which look dissimilar as opposed to analogy which is a resemblance in appearance and function only.)

The term jaundice is rather euphemistic. The morbid state arising from the parenteral entry of an isoserum is a serious form of hepatitis and much more likely to prove fatal than the 'catarrhal jaundice' of convenience.

The available evidence suggests that the causative agent, probably a virus, is not the same as that causing the naturally occurring infective hepatitis (MacCallum, 1946).

The jaundice transmitted by syringes, the late hepatitis following injection of any therapeutic agent, is identical with homologous serum jaundice and is communicated by traces of blood transferred on syringes and needles from man to man (Memorandum, 1945).

Cases in children attracted attention in the beginning.—In 1937, 4 children died in or near Oxford, after receiving injections from a single batch of measles convalescent serum, nine or ten weeks previously. Eventually 109 recipients of the serum were traced, 41 had been ill subsequently, 37 of them with jaundice. Eight had died of hepatic necrosis. All deaths had occurred between the 61st and 93rd day after receiving the injection (MacNatty, quoted by Bradley, 1946).

Cases in adults attracted attention later.—The American troops receiving *yellow fever vaccine* developed jaundice. This was not due to the yellow fever virus but to the human serum used as a vehicle of the virus (Findlay, 1940, quoted by Bradley, loc. cit.). The icterogenicity was confined to certain batches of the vaccine with adjacent serial numbers.

Mumps serum jaundice attracted attention in England. In a unit of a British Tank Corps two batches of pooled serum, from 11 convalescent

cases, were given to 260 cases once and to 204 of the same men twice at 14 days' interval. Two hundred and twenty men were followed up. 44.7 per cent developed jaundice 44 to 123 days later (Beeson et al., 1944).

Pappataci vaccine jaundice was noticed in Southern Russia. The active virus had been mixed with convalescent human serum.

Jaundice after blood, plasma or serum transfusion has been noticed in England in many cases, 2 to 4 months after the transfusion. Deaths have occurred from hepatitis. No previous treatment of the whole blood plasma or serum appears to be effective in preventing the disease (MacCallum, loc. cit.). Very small quantities of serum (0.01 c.c.) can infect.

The natural communicability of the disease, if it be naturally communicable at all, is of a very low order. The incubation period is very long, of the order of months (Bradley, loc. cit.).

Similar disease in animals.—Jaundice with mad staggers has been reported in horses after immunization with antigens administered in horse serum (Theiler, Gordon, March and Slagsvold, quoted by Bradley, loc. cit.).

Treatment.—Two apparently hopeless cases of serum hepatitis have been treated successfully with protein hydrolysates intravenous 'alimentation' (500 c.c., equivalent of 25 grammes protein, preceded by 500 c.c. of 5 to 10 per cent glucose) for several days (Simon and Brown, 1946; Magee, 1946). Large doses of methionine (2.5 to 3 grammes orally) have also been found useful (Beattie and Marshall, 1944a; Beattie and Marshall, 1944b; Beattie, 1946). This drug, however, has not been found useful in the impairment of liver function by other workers (Cook and Hoffbauer, 1946).

A new risk in blood transfusion.—In blood transfusion to the usual risks—incompatibility of the red blood cells and sera, syphilis and malaria—must be added the new risk of the homologous serum hepatitis. As a safeguard it has been naturally suggested that the donor should not have suffered from jaundice (Snyder, 1947). This precaution will exclude all previous sufferers from jaundice including those who might have suffered from the variety which on inoculation into other subjects might give rise to the homologous serum jaundice. But it has not been established that the donors of the sera which did give rise to the disease had suffered from jaundice.

Substitutes for transfusion.—Perhaps the protein hydrolysates could replace plasma and serum for most cases needing a transfusion. The compatible red blood cells washed free of the serum in saline could be used for the whole blood, if the virus is found in the serum only. As a matter of fact the preserved blood used in the World War I consisted of preserved red blood cells only (Wiener, 1943).

The serum can be eliminated by dilution with a large quantity of saline of a small quantity of whole blood. The settled cells can be separated,

re-suspended in another large volume of saline and allowed to settle a second time. If the supernatant fluid after the second settlement does not react with a strong antihuman serum, the chances of any serum being left after a third settlement are negligible. The average antihuman serum used for medicolegal purposes in India detects the human serum in a dilution of 1 in 40,000 (Greval and Chowdhury, 1947). A stronger antiserum can be prepared for the purpose. A possible diffusion of the contents of the red cells into the saline will not interfere by giving a false positive reaction. This material does not react with the antiserum prepared against the serum (Greval and Chowdhury, 1945).

Only human serum albumen may be used. This derivative has been reported to be free from the ieterogenic agent (Climenko, 1947).

Special selection of donors.—When a real whole blood transfusion is considered absolutely necessary, members of the same family, community and locality (in this order) are likely to provide safer donors than total strangers. The history of the former is better known, and because of a similar environment, the recipient and the donor are likely to have a similar immunological constitution.

No Indian cases.—Post-transfusion homologous serum jaundice has not attracted attention in India yet. The Calcutta Blood Bank provided blood and serum for 6,762 transfusions during 1945, 1946, and a part of 1947, mostly to hospitals, and did not receive a single report of a recipient developing jaundice after a month or so (Chatterji, 1947, personal communication). It is quite possible that the disease, like many other European diseases, does not thrive on Indian soil (Greval, 1946).

A re-estimation of the utility of blood and blood production.—The use of convalescent serum for children cannot be considered safe any longer in Europe at any rate. Measles could not have killed as many children at Oxford as were killed by the serum.

The utility of transfusion, in civil practice, also needs a reconsideration. It should be differentiated from a mere boost. Such a boost in the transfusion of whole blood has been suspected and discouraged (Albrecht, 1946). It should be discouraged in the transfusions of other constituents of blood also.

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THE DANGERS OF EXCLUDED INTESTINAL SEGMENTS

Loops of intestine, by-passed or excluded for one reason or another, are subject to certain acute accidents which, if not remembered and provided for, may vitiate an otherwise satisfactory operation. The naturally excluded loops—the appendix and Meckel's diverticulum—are no exceptions to this rule. The acute accidents common to these loops, natural or artificial, are intussusception and perforation.

Intussusception of the appendix was first reported in 1859 by McKidd, since when about one hundred cases have been reported in the literature. What proportion of the total number observed this figure represents is unknown, but it must be less than half for by far the greater number of members of the profession are distinctly reluctant to publish their interesting cases. Meckel's diverticulum is mentioned as a cause of intussusception many times between the date of its discovery, at the beginning of the nineteenth century, and 1913, when Wellington collected 326 cases of urgent surgical conditions arising in this remnant. Among these were 144 cases of bowel obstruction, 59 of which were due to intussusception of a Meckel's diverticulum.

Experimentally, Nothnagel (1884) produced intussusception by direct faradic stimulation of the intestine. Propping (1910), using rabbits and large doses of physostigmine, was able to cause small invaginations of the gut. All experimental workers using dogs are familiar with the fact that intussusception will occur following severance and inversion of the ends of the upper small intestine unless the precaution is taken of fixing the distal segment to the anterior or posterior wall of the abdomen.

Perforation of the appendix and of Meckel's diverticulum are well known. But the possibility of perforation of an excluded segment seems to be often forgotten. The dangers of leaving such

excluded segments in the abdomen were pointed out by Grey-Turner (1916), when he cited some of his own cases in illustration.

Experimentally, it is easy to produce perforation by excluding the proximal loop instead of the distal one.

In view of these facts it is well worth while remembering at the operation table what a few more minutes and several anchoring sutures will do towards making a final success of a procedure. It is well to consider any operative plan, made hurriedly to meet unforeseen circumstances, in the light of these facts before embarking on a line of action which may lead to the

exclusion of a distal or proximal segment of intestine.

An article in this connection is appearing on p. 203 of this issue.

A. T. A.

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Medical News

FORMATION OF WORLD HEALTH ORGANIZATION

(Abstracted from the *Medical Press*, 28th August, 1946, p. 159)

THE Economic and Social Council of the United Nations, by a resolution of 15th February, 1946, convened an International Health Conference to establish an International Health Organization. The International Health Conference met in the City of New York from 19th June to 22nd July, 1946. More than fifty countries sent representatives, and seventeen States were represented by observers. The Conference drew up and signed the Constitution of the World Health Organization, an arrangement for the establishment of an Interim Commission of the World Health Organization, and a Protocol Concerning the *Office International d'Hygiene Publique*. At the same time, steps were taken to transfer to the new Health Organization such health functions as had been formerly carried out by the League of Nations Health Organization.

THE FOURTH INTERNATIONAL CANCER RESEARCH CONGRESS

THE Fourth International Cancer Research Congress will be held in St. Louis, Missouri, U.S.A., during 2nd to 7th September, 1947. The Union Internationale Contre le Cancer having accepted the invitation of the American Association for Cancer Research, the Congress will be held under the joint auspices of these two organizations, with Dr. E. V. Cowdry, Professor of Anatomy, Washington University School of Medicine and Director of Research of the Barnard Free Skin and Cancer Hospital, serving as President of the Congress.

Of the three Congresses that have been held previously, the first was in Madrid, Spain, in 1933; the second in Brussels, Belgium, in 1936; the third in Atlantic City, New Jersey, U.S.A., in 1939. Due to the recent war, there has been no meeting of the Congress during the past eight years.

The State Department in Washington having approved of the International Cancer Research Congress, official invitations soon will be sent to all foreign governments who are to send delegates.

Initial steps in the organization of the Congress have been completed, in that all officers and committees have been appointed and are enthusiastically at work. In addition to the President, Dr. E. V. Cowdry, Dr. J. Godard, President of the Union Internationale Contre le Cancer, and Dr. W. U. Gardner, President of the American Association of Cancer Research, will serve ex-officio as members of the Executive Committee.

The following Committee personnel have accepted Chairmanships:—

- A. N. Arneson, St. Louis, Missouri—Local Arrangements.
 S. Bayne-Jones, New Haven, Connecticut—Finance.
 C. W. Larimore, New York, N.Y.—Exhibits.
 L. A. Scheele, Bethesda, Maryland—Governmental Liaison.
 M. G. Seelig, St. Louis, Missouri—Publicity.
 Shields Warren, Boston, Massachusetts—Programme.
 Headquarters will be at the Hotel Jefferson, St. Louis, where some three hundred rooms will be available for guests. In addition to these rooms, other nearby St. Louis hotels have signified their willingness to make reservations on advance notice to make contemplating attendance at the Congress.

THIRTEENTH CLINICAL MEETING OF THE CALCUTTA SCHOOL OF TROPICAL MEDICINE HELD ON MONDAY THE 13TH JANUARY, 1947

DR. DHARMENDRA showed three cases of leprosy of the lepromatous type in whom the disease had remained subsided for two to five years. In the beginning the cases had fairly extensive lesions typical of the lepromatous type; at the time of demonstration, however, there were practically no visible signs of the disease. The lesions had gradually subsided and faded, and the smears once strongly positive for leprosy bacilli became less and less strongly positive, and ultimately negative and had remained negative. The cases were presented to illustrate a little-appreciated feature in the course of leprosy; it is not often that the disease, even in the lepromatous type of cases, may show early subsidence, and may not become progressively worse.

Dr. Chettri described a case of typhus which appeared clinically one of scrub typhus but the agglutination test was not of diagnostic titre.

Major A. L. Som demonstrated a case of posterior extra-articular scapulo-humeral arthrodesis with an arrow graft from tibia (Britton's technique). Recent x-ray showed that the graft was living. It was a case of old fracture dislocation of the upper end of right humerus with axillary palsy. Shoulder joint movements were very limited and painful. Now the patient can raise his right upper limb up to 90° abduction, can take food with right hand, and can perform light duties.

Dr. H. Ray demonstrated a case of chronic advanced gout. The patient was a Mohammedan male, aged about 35 years, and was a cultivator by occupation. No history of any alcoholism or overeating of food rich in nucleoproteins was available. Family history irrelevant. The condition started in the left tarsus

following a sprain 12 years ago as an acute arthritis. Since then several recurrences took place gradually involving multiple, big and small, joints of the limbs. At the time of demonstration, gross deformity of the hands and feet with limitation of movements was obvious. Multiple tophi, some cutaneous and some subcutaneous, were present. Material from one such tophus examined microscopically revealed acid sodium urate crystals. A skiagram of the hand revealed scattered areas of bone absorption; osteophytic growths from the bone ends, narrowing and at places osseous bridging of the joint spaces and a pathological fracture of one of the phalanges. Blood uric acid was 8 mg. per 100 c.c. Refractoriness of the case to usual lines of treatment was pointed out.

Dr. Hafizur Rahman showed one case of thyroglossal fistula. This was a complete fistula from the foramen cæcum to middle of the thyroid cartilage where it opened up. He also showed a case of congenital dislocation of right hip in a child of 18 months. The trouble was noticed by the parents as the child did not try to stand up at the right age.

Dr. N. V. Bhaduri discussed the treatment of intestinal worms with the indigenous drugs, Butea, Embelia and Kamala. Due to the want of imported anthelmintics during the last war, the indigenous drugs, Butea, Embelia and Kamala were tried in hookworm, *Ascaris*, *Trinia* and *Hymenolepis* infestations of man. These drugs were found to have no effect on hookworm and tapeworm. In *Ascaris* infestations, Butea and Embelia were found better than santonin and equally as good as oil of chenopodium. Comparative results and dosages are given below:

Drug	Dose in grains	Number treated	Number cured	Percentage
Butea	8-30	24	4	16.6
	60-120	12	8	66.6
Embelia	30	2	0	Nil
	60-180	10	4	40
Combined Butea and Embelia ..	10-45	135	24	18
	60-180	97	47	48
Combined Butea, Embelia and Kamala.	10-30	19	2	10.5
	60	6	3	50
Santonin	3	90	31	33
Oil of chenopodium	1.5 c.c.	67	37	55

These indigenous drugs are cheaper than santonin and oil of chenopodium. Two drachms of either Butea or Embelia cost less than one pice while one 3-grain dose of santonin costs three annas and a dose of oil of chenopodium (1.5 c.c.) costs about two annas.

Dr. D. N. Roy described briefly the different methods of 'delousing' in connection with head and pubic lice. The two most successful preparations for head lice are pyrethrum extract and phenyl cellosolve (monophenyl ether of ethylene glycol). Pyrethrum extract is prepared with kerosene and sprayed by means of a De Vilbiss atomiser no. 15 on every part of the hair. The insecticide is then rubbed in the hair in order to ensure uniform distribution of the oil globules. Phenyl cellosolve mixture is prepared with absolute alcohol and water in a 5 per cent strength and applied to the hair by means of a wad of cotton-wool, sufficient quantity being used to wet the hair thoroughly. Both the preparations are effective in destroying all stages of lice including eggs. D.D.T. acts on lice but not on eggs. As regards pubic lice, infestation of all parts of the body except the eyelashes may be treated with either of the above preparations. Pubic lice on eyelashes are killed by pyrethrum ointment prepared with the dust in 8 per cent strength and applied locally for four nights in succession.

'COLLEGE OF PHYSICIANS AND SURGEONS OF BOMBAY'

INSTITUTION OF POST-GRADUATE DIPLOMAS IN VARIOUS SUBJECTS

The Council of the College of Physicians and Surgeons of Bombay at its meeting held in January 1947, decided to institute Post-graduate Diplomas in the following subjects:—

- (1) Dermatology and Venereology.
- (2) Oto-Rhino-Laryngology.
- (3) Orthopædics.
- (4) Anæsthetics.
- (5) Radiology.
- (6) Anatomy.
- (7) Physiology.

The regulations relating to these diploma examinations are under preparation.

COLLEGE OF NURSING IN INDIA

(Abstracted from the *Science and Culture*, Vol. XII, No. 4, October 1946, p. 187)

INADEQUACY of Health Personnel in India is emphasized in the 'Report of the Health Survey and Development Committee, 1946'. It has been estimated that the number of registered nurses available in India at present is 7,000, i.e. 1 nurse to every 43,000 people. The Bhoré Committee has recommended that the number of trained nurses available in the country should be raised to 740,000 by 1971, i.e. 1 nurse to every 300 people (this is the ratio existing in the United

Kingdom). An essential step towards the achievement of this object is the removal of the existing unsatisfactory condition of training and service.

We welcome the establishment of the 'first nursing college in India' and we hope that more colleges will be established in every province so that it may at least be possible to reach the target fixed for the short-term ten-year programme, i.e. 80,000 nurses without delay. To raise the number of nurses to 80,000 in ten years is not simple and the establishment of specialized hospitals and schools of nurses is the immediate problem and more so for the fact that the need for nurses is even greater than that for doctors.

The College which opens this year as a constituent part of Delhi University offers a four-year preparatory course which will integrate the teaching of health and preventive medicine throughout the entire course. It will prepare nurses to give good nursing care in the homes of both urban and rural areas, as well as in the hospital. Other colleges and the hospitals of Delhi are co-operating in the course and it will lead to the degree of B.Sc. (Honours) Nursing.

The College is located at 12, Jaswant Singh Road, New Delhi. The course of study is given below in order to draw the attention of readers and responsible leaders of opinion to encourage Indian girls to join the

course. No doubt other universities will initiate such a course if the demand for it increases.

The College provides a course for the B.Sc. (Honours) Nursing of the Delhi University. The course of study extends over a period of four academic years. The Honours course includes the following subjects:—

- (a) Main subject—Nursing.
- (b) Two subsidiary subjects:
 - (i) English;
 - (ii) Elementary Science (Physics, Chemistry and Biology).
- (c) Any one of the following qualifying subjects:
 - (i) History of Science and Scientific method;
 - (ii) World History;
 - (iii) Modern Indian History.

The minimum qualification for candidates desiring admission to the course is:—

- (i) The Higher Secondary Examination of the Board of Higher Secondary Education, Delhi, or any examination recognized as equivalent thereto, or the London Matriculation Examination or the Cambridge (Senior) School Certificate Examination or the Oxford School Certificate Examination, or
- (ii) The Qualifying Examination conducted by the University of Delhi, or
- (iii) The Intermediate Examination of any Indian University incorporated by any law for the time being in force, or any examination recognized as equivalent thereto.

The College Session commences on the 25th July, and applications for admission should be submitted by 30th June on forms that can be obtained from the Principal.

IMPORT LICENCES UNDER DRUGS RULES

(Reproduced from a press note dated 1st March, 1947, issued by the Government of India, Department of Health, New Delhi)

UNDER the Drugs Rules, 1945, which come into effect from 1st April, 1947, licences are necessary for the import of biological and other special products intended for sale and of products intended for examination, test or analysis.

Owing to printing delays it has not been possible to make available to the trade printed copies of forms of application prescribed for the purpose under the Rules. Pending availability of printed forms, importers should submit typed applications in the prescribed forms to the Drugs Controller, c/o Director-General, Indian Medical Service, New Delhi.

Where fees have been prescribed under the Rules, the applications are to be accompanied by a treasury receipt.

HISTORICAL ASPECTS OF TUBERCULOSIS

'THE history of tuberculosis can be defined as the history of civilization itself', observed Lieut.-Colonel R. Viswanathan, T.B. Adviser to the Health Department, Government of India, speaking on 'Historical Aspects of Tuberculosis' at the Delhi University recently.

He said that there was evidence of tuberculosis of bones and joints even in the pre-historic man of the Neolithic era.

In ancient India during the period of Rigveda there is a hymn consecrated to the cure of *Yakshama*, which is nothing else than what is now called tuberculosis. The laws of Manu lay down certain preventive measures including objections to marriages with tuberculous patients. The writings of Susruta contain cures for the disease, apart from prescribing early morning fresh air, horse riding and good food.

The old books of China speak of lung cough and lung fever known in Chinese as 'Laoping'. The remains of Egyptian mummies show definite evidence of tuberculosis, while the fire-worshippers of Persia, the Hebrews of Judea and the subjects of Alexander the

Great were well acquainted with the ravages of the disease. Hippocrates, father of Greek medicine, described for the first time the real symptoms of the disease and applied to it the name of *Pthylisis*.

While for nearly 15 centuries after Christ there was little advance in medical science in Christendom, Arabia made rapid advances during the 7th, 8th and 9th centuries. Rhazes (850-923) and Avicenna (980-1037) searched for cause and cure of diseases. The latter wrote on the subject of tuberculosis and prescribed dry air and sugar distilled from grapes as remedies.

Developments in modern times

Further researches were made during the period 15th to 18th century when scientists in different countries began to take greater interest in the disease and described its symptoms and prescribed remedies. In the 18th century Richard Martin, an Englishman, published his book called *Pthysilogia* which gave a good clinical description of the disease.

Coming to more modern times, Colonel Viswanathan said that Laennec (1781-1826) laid the foundation for the present-day knowledge about the pathology of pulmonary tuberculosis. After performing a thousand post mortems he published a paper in which he said that tuberculosis affected not only the lungs but other organs as well. He also invented the first stethoscope.

In the 19th century Bodington advocated for the first time sanitarium treatment. He was laughed at when he made the suggestion but it was taken up in Germany by Dr. Brehmer who started the first sanitarium in the world. Since then the sanitarium idea has spread to different countries.

In 1882 Robert Koch discovered the tubercle bacillus, the germ which is the cause of the disease. The next important milestone was the discovery of x-rays by Röntgen in 1895. A definite advance in the treatment of the disease was made by the introduction of artificial pneumothorax therapy by Carlo-Forlanini. Since then various surgical procedures have been adopted with the main object of collapsing the diseased organ which will enable it to be at rest.

Tuberculosis was tackled for the first time as a community disease when Sir Robert Phillip initiated the dispensary scheme in 1887.

Concluding, Colonel Viswanathan said that the discovery of certain antibiotic drugs like streptomycin acts as a pointer to the possibility of producing a drug which can be used as a specific for tuberculosis.

MATERNAL AND INFANT MORTALITY IN U.S.A.

INFANT mortality declined further in 1946 from the low rate for 1945, announces the U.S. Public Health Service, Federal Security Agency. Provisional figures for the first 10 months of 1946 indicate a decrease of 3.2 per cent from the rate for the same period of 1945.

Final figures for 1945 released at this time show that the infant mortality rate of 38.3 deaths under 1 year per 1,000 live births was the lowest ever recorded for the United States. It is 3.8 per cent lower than the rate of 39.8 for 1944. Infant deaths numbered 104,684 in 1945 as compared with 1944 when there were 111,127 deaths under 1 year.

The maternal mortality rate of 2.1 per 1,000 live births for 1945 also showed a reduction of nearly 9 per cent from the rate of 2.3 for the previous year. The numbers of deaths from puerperal causes on which the maternal mortality rates are based were 5,668 and 6,369, respectively, for 1945 and 1944.

One of the factors contributing to the lower infant and maternal mortality rates is an increase from 1944 to 1945 in the proportion of babies delivered in hospitals. In 1945, 78.8 per cent of all births registered in the United States were reported to have occurred in hospitals or other institutions. This represents an increase of 3.2 per cent from 1944 when 75.6 of recorded births took place in hospitals.

The attached table presents infant mortality rates by State of residence for the years 1944 and 1945. For twenty-eight States the rates for 1945 were below the rate for the United States. In general, low infant mortality rates indicate effective programmes of medical and nursing care for mothers and infants, of communicable disease control, and environmental sanitation. Because infant mortality rates are usually lower for white populations than for non-white groups the rates vary from State to State with differences in the racial composition of the population. Incomplete registration of births as well as infant deaths are extrinsic factors which influence infant mortality rates. The effect of the former is to raise the rate above its true value, while incomplete registration of infant deaths has the opposite effect.

Infant mortality rates for 1945 and 1944: United States and each State (exclusive of still births. By place of residence)

Area	Infant mortality rate per 1,000 live births	
	1945	1944
United States	38.3	39.8
Alabama	14.7	45.5
Arizona	68.7	68.8
Arkansas	31.7	34.7
California	32.5	34.5
Colorado	50.3	49.4
Connecticut	29.9	30.7
Delaware	38.9	48.7
District of Columbia	48.3	44.8
Florida	43.8	45.5
Georgia	42.2	44.5
Idaho	35.0	34.0
Illinois	31.6	32.4
Indiana	36.0	34.5
Iowa	30.3	33.1
Kansas	33.0	33.3
Kentucky	46.9	46.7
Louisiana	43.0	46.3
Maine	46.3	46.7
Maryland	38.0	41.5
Massachusetts	31.6	33.1
Michigan	35.8	37.9
Minnesota	31.3	31.3
Mississippi	40.6	44.1
Missouri	37.5	37.6
Montana	34.2	36.1
Nebraska	28.2	33.0
Nevada	46.3	50.2
New Hampshire	36.3	37.7
New Jersey	32.0	34.0
New Mexico	100.8	89.1
New York	31.8	32.8
North Carolina	43.3	45.4
North Dakota	29.3	35.4
Ohio	36.5	38.5
Oklahoma	40.0	41.2
Oregon	28.7	30.5
Pennsylvania	37.9	40.0
Rhode Island	28.2	35.3
South Carolina	49.9	54.9
South Dakota	31.1	34.9
Tennessee	47.7	45.5
Texas	48.8	50.4
Utah	31.1	33.9
Vermont	34.6	40.6
Virginia	47.4	47.1
Washington	34.5	33.8
West Virginia	52.0	52.0
Wisconsin	31.1	32.0
Wyoming	40.0	41.2

GERMAN 'PHASE' MICROSCOPE MAY AID CANCER RESEARCH

(Abstracted from the *Journal of the American Medical Association*, 20th July, 1946, p. 1010)

A SO-CALLED 'phase' microscope, obtained recently in Germany by army scientists, has been tested here and may be of use in studying how a normal, healthy cell changes into the deadly cancer cell. A film was made with the phase microscope by Bureau of Standards physicists and biologists and it showed cell reproduction with amazing clarity. With special lenses the phase microscope accents enormously slight optical differences.

UNUSUAL NURSING SERVICE: AUSTRALIAN SISTERS' SUCCESS

By MARGARET LAWRENCE

(From Release No. MNL/112 issued by the Public Relations Officer, Australian High Commissioner's Office, Australia Office, Connaught Place, New Delhi)

AN unusual form of nursing service, with definite possibilities, is the suburban surgical dressing station recently opened by three Australian nurses in Melbourne (Victoria).

The girls' mother—also a trained nurse—is elderly and a semi-invalid, and they were anxious to devote more time to looking after her and to housekeeping than would be possible if they were working full-time in hospital wards.

Threshing out their problems at a round table family conference, the girls decided there was no regular form of nursing service that would suit their case—so they invented one!

The idea of a suburban dressing station, where dressings could be changed, injections given, minor ailments treated by trained nurses, and minor operations performed by doctors, seemed to offer the girls a chance of following their profession in their own home.

Their experience in public and private hospitals convinced them that a real need existed for decentralization of hospital facilities, and that a surgical dressing station such as they envisaged might, even though on a very small scale, point the way to such decentralization.

Most of Melbourne's great public hospitals are situated in or near the city, so that the provision of such a station would save many sick and elderly patients a long and tiring journey, often followed by a long wait in the out-patient's clinic.

The girls' experience of hospital wards had shown them how often the doctor's time is taken up with minor treatments, well within the capabilities of a trained nurse. So the station would help to relieve the pressure on overworked doctors.

Similarly, by providing an operating theatre where visiting doctors could perform minor operations, and a recovery room where patients could rest for a few hours, the station would relieve the pressure on the beds of private hospitals.

Doctors, nursing authorities, medical superintendents and almshouses at public hospitals whom the girls consulted warmly supported their plan. Local doctors welcomed the establishment of the station, and gladly promised to send suitable cases for treatment.

The plan decided upon, the next step was to transform three rooms of an ordinary small bungalow home into a waiting room, rest or recovery room and surgery. The sisters proved themselves just as handy with kalsomine and paint brush as with a roll of lint and a thermometer.

Their gleaming whitewalled surgery is equipped with operating table, and apparatus, basins, instruments, linen, lotions, bandages and everything that would normally be found in the operating room of a small country hospital.

Total cost of transforming and equipping the three rooms—thanks to natural ingenuity and the purchase of secondhand hospital furniture—was Rs. 2,142.

Public Health Section

A TENTATIVE HEALTH AND HYGIENE PROGRAMME FOR RAILWAY SCHOOLS IN INDIA

By A. W. J. MORGAN, M.R.C.S., L.R.C.P.,
D.P.H., F.R.S.T.M. & H.

Chief Medical Officer
Bengal Nagpur Railway

SCHOOL health and hygiene schemes are well known in America and England, and while considerable progress has been made in various parts of India regarding the medical inspection of children of school age, it is felt that a preliminary report on a scheme in a controlled group of railway schools should be of interest to those who are concerned in the development of this branch of hygiene.

This preliminary report covers twelve months' working from 1st July, 1945 to 30th June, 1946; and without going into the details of the budget, it may be stated that the cost of the scheme amounts approximately to Rs. 8 per child per annum. It has, however, been worked out that if all the schools on the B. N. Railway are eventually included in the scheme, the cost may be reduced to Rs. 5. It may be of interest to know that the cost of similar schemes in the United Kingdom is 7 shillings and U.S.A. 1.5 dollars (pre-war).

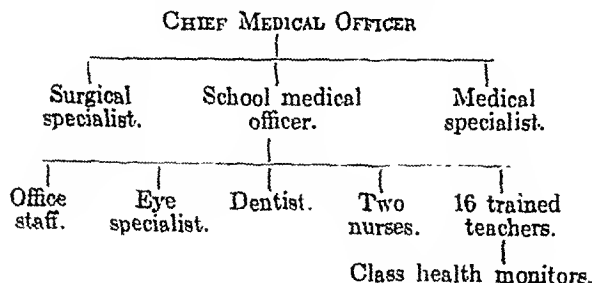
The details of the schools covered are as follows :—

Four schools have been taken up for work for a total strength of over 2,000 pupils :—

	Number of pupils
1. European High School	280
2. Indian High School	1,200
3. Indian Girls' School	276
4. Indian Primary School	302

The European school is a mixed school.

Organization and personnel



It was realized from the outset that it was essential to secure a suitable wholtime school medical officer who had a leaning towards this type of work and also in possession of a Diploma in Public Health. The services of one of such on a salary of Rs. 375-25-750 were secured. He works directly under the Chief

Medical Officer and is responsible for maintaining all the records.

To assist him in his duties there are two school nurses at Rs. 150 per month (fixed).

It was also essential to secure the intelligent co-operation of the school teachers. Although the syllabus for the normal training of teachers in India certainly contains instructions in school hygiene, it was felt that a further course of training would be very valuable. Suitable teachers were picked from the existing cadre and given an intensive practical and theoretical course. A curriculum was prepared, the first of its kind in India, for the training of 15 of our school teachers at the All-India Institute of Hygiene and Public Health, Calcutta. The course lasted three weeks and at the termination an examination was held. The teachers passed their examination and were given a certificate and their basic salary was enhanced by 10 per cent. The course was held during their vacation. and this leave will be made up to them when departmentally convenient.

The Railway Medical Department is fortunate in the fact that the Chief Medical Officer has at his disposal the following specialists : Surgical, Medical, Ophthalmic and Dental, so that defects could be referred to them for correction.

An important feature of the scheme was the attempt to interest and receive the co-operation of the parents. Each parent received a circular letter as follows :—

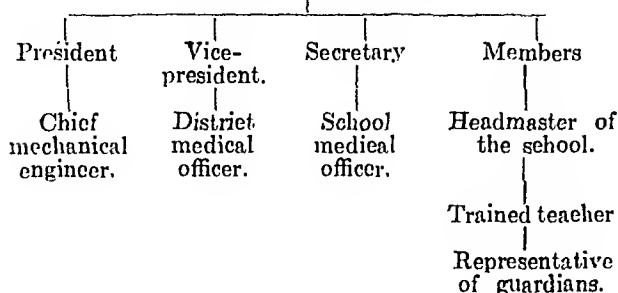
'A School Hygiene Scheme has been introduced in to the schools, and a school medical officer has been appointed by the railway administration solely for the railway schools here. He will examine your child or ward of class . . . free of charge on the . . . between . . . and . . . hours. It will be appreciated if you will please be present in the school when your child will be examined so that you may have an opportunity to tell the doctor anything about the child that he should know and that he may also give you useful advice about the child. This is very important, all the cases will be closely watched and followed up for the years the children will be in the school. I am sure you will be pleased to co-operate with us in making this very useful scheme a success in the interests of your wards reading in the school'.

Arising out of the interests of the parents are the staff conferences and the parent-teacher meetings. The staff conferences are separate for each school. These are held once a week to review the work of the past week, to draw up advance programmes and to discuss the difficulties. Members of the conferences are the trained teachers and nurses with the school medical officer as chairman. Forty-two such meetings have been held so far. Parent-teacher meetings serve the useful purpose of removing occasional obstacles in setting up the programmes, such as public lethargy, suspicion and ignorance of the parents. Each of the

trained teachers is contacting at least 5 parents in one week.

In order to further carry out effectively the programme and secure the co-operation of parents, a School Health Committee had to be set up :—

SCHOOL HEALTH COMMITTEE



There are two separate committees, one for the European school and the other for the Indian schools. These meetings are ordinarily held once a month.

Programme of the health work

1. School sanitation

The first step was a thorough survey of the sanitary position, particularly regarding buildings (air, light and ventilation), safe water supply, clean toilets and lavatories. During 1945, four schools were surveyed and the results of survey are given below :—

Schools with satisfactory structural condition, lighting, water supply and ventilation ..	4
" completely equipped with proper desks or benches ..	3
" with adequate playground facilities ..	3
" " required floor space per pupil ..	1
" " adequate latrine accommodation ..	1
" " separate accommodation for boys and girls ..	1
" " refuse baskets for each class ..	1

The plans for improvement have been submitted to the Engineering Department.

Periodic sanitary inspection of school premises and sanitary equipment is done by the school medical officer and nurse at least once a week.

Records are kept and brought before the committees.

2. Medical examination

(a) *Scheme of examination.*—This was commenced on 1st July and carried out in accordance with a previously drawn advance programme. The parents were informed of the initial medical examination and requested to attend (see circular above). On an average 6 to 7 children were examined per hour. Heights and weights were recorded, followed by complete physical examination of the child.

Defects observed were recorded on the prescribed form for each child. Specific notations used to signify the presence and severity of the defects are subsequently tabulated in the prescribed form. Parents are notified of

the results of the examination and the recommended course which should be adopted for relief.

(b) Results of examination.—

Name of school	Total examined	Number defective	Percentage defective	Total number of defects*
European	340	269	79	643
Indian ..	1,803	1,516	84	4,312

* There were approximately more than 2 defects per child, the percentage of defects being more in the Indian schools.

Nature of defects

1. *Malnutrition.*—(68.6 per cent of children examined).

The 'Nutrition Assessment Score Card' was used. The nutritional deficiencies were tabulated as slight, moderate and severe.

Comparative figures of malnutrition, Indian schools and European school :—

School	Total examined	WITH NUTRITIONAL DEFECTS	
		Total	Percentage
Indian	1,803	1,347	74.7
European	340	125	36.7

The deficiencies observed have been mainly due to lack of vitamins in their diets.

2. *Teeth and gums.*—(34.2 per cent).

The percentage of dental defects in Indian schools and European school was 31.9 per cent and 48.4 per cent respectively.

Broadly classifying the various types of dental defects were: Dental caries 84 per cent, tartar 8 per cent, bleeding gums 6 per cent and root abscess 2 per cent. To what extent dietetic errors were responsible for this high incidence it is difficult to say.

3. *Anæmia.*—(34.1 per cent).

It has not been as yet possible to commence routine laboratory examinations. In part, this anæmia was very likely due to causes other than nutritional, such as parasitic infestation.

4. *Enlarged glands.*—(18.4 per cent).

5. *Throat.*—(17.5 per cent).

The incidence of throat defects was fairly high, being more in the European school.

6. *Eyes.*—(11.0 per cent).

The majority of eye complaints was due to myopia, conjunctivitis, blepharitis and styas.

7. *Heart.*—(4.0 per cent).

Defects were organic, functional and nutritional. In 0.6 per cent (i.e. 14) organic lesions were detected due to rheumatic infections.

8. *Lung diseases.*—(0.7 per cent).

No tubercular lesions were detected clinically.

9. *Others*.—(41.6 per cent).

Uncleanliness constituted half of this group. Detected mainly amongst Indian school children who were also found to be ill-clothed and without shoes in the majority of cases. *Lousiness* and *scabies* formed the next major group.

Leprosy was detected in 7 cases during the routine examination. They were promptly excluded from the schools and referred to clinics for treatment. Non-infective cases, confirmed by the School of Tropical Medicine, Calcutta, were later on allowed to attend the school.

Immunization status

Vaccination against smallpox.—At the time of initial examination all the children were found with vaccination scars but there was no systematic record as to when the vaccination was done; so all the children were re-vaccinated. Records are kept of those vaccinated elsewhere.

The results of vaccination against smallpox have been classified as follows :—

	Per cent
(a) Those showing immune reaction ..	98.82
(b) " " accelerated reaction ..	0.41
(c) " " primary reaction ..	0.77

During the year under review only 4 cases of smallpox occurred among the children.

Correction of defects

The defects are tabulated in respective categories and corrected by making use of the existing facilities :—

1. *Central clinics*.—Held at the central place, office of the school medical officer, mainly on holidays and outside the school hours. One hundred and eighty-two minor cases have been treated.

2. *School clinics*.—Held within the school premises during school hours for the following conditions :—

(a) *Malnutrition*.—This is the biggest problem. However, a serious effort is made to combat it by giving the children, showing nutritional defects, multivitamin-cum-mineral tablets obtained from the American Friends Service Committee, on an average at the rate of 2 tablets per child daily for a period of three months. In most of the cases the course had to be repeated. In all, 1,417 children have been given multivitamin tablets.

For improvement of nutrition, a scheme is being formulated whereby each school child will be given 8 oz. of milk per day.

(b) *Scabies*, *malaria*, *ringworm*, *sore throat*, *conjunctivitis*, *ear affections*, *cuts* and *wounds*.

(c) *Delousing* is accomplished by thoroughly dusting the head for three consecutive days with 10 per cent powder of D.D.T. in soap stone. On the fourth day a thorough wash is given with soap and hot water. The result of the treatment has been very encouraging.

Figures for (b) and (c) are condensed in the table below :—

Treatment given in the school clinics

Diseases	European	Indian High	Indian Girls'	Indian Primary
1. Cuts, wounds and others	86	431	144	263
2. Scabies ..	10	185	141	253
3. Throat affections ..	63	95	10	4
4. Pink eye ..	7	43	55	14
5. Lousiness ..	80	41	103	31
6. Ear discharge ..	5	49	2	7
7. Ringworm ..	1	4	1	..
8. Malaria ..	..	7	..	3
TOTAL ..	252	855	456	575

3. *Dental clinics*.—Held three times a week by a dentist.

(1) Number with dental defects ..	734
(2) Number corrected ..	435

To date, approximately 59 per cent of the cases have been corrected.

Number of children attended by dentist ..	435
Number of teeth attended by dentist ..	814

Nature of correction done :—

(1) Extractions ..	547
(2) Filling ..	67
(3) Lancing ..	64
(4) Scaling and gum treatment ..	136
TOTAL ..	814

4. *Eye clinics*.—An ophthalmic surgeon attends to the eye cases three times a week outside school hours.

Number of children with eye defects ..	257
Number attended by the eye specialist ..	220
Number with refractive errors ..	73
Number with eye diseases: ..	51
(1) Conjunctival diseases ..	34
(2) Squint ..	6
(3) Blepharitis ..	5
(4) Others ..	6

In the group of conjunctival diseases, chronic catarrhal conjunctivitis and trachoma were most common. Out of 73 cases of errors of refraction, 53 had glasses prescribed to them.

The surgical and medical specialists of Khargpur Hospitals helped (a) in aiding to confirm the diagnosis and (b) in the treatment of more serious and complicated cases. The local dispensaries are also available for the treatment of cases whenever referred.

Immediate information is given to the school medical officer regarding children sick at home and treated there.

Campaign for correction of defects does not end here, but careful watch is kept on the children given treatment. This is incorporated in 'Follow-up programme', i.e. children are followed up till and after the defect is corrected. It is applied in four circumstances:—

- (a) Children absent for 3 days or more.
- (b) Children excluded from school.
- (c) Children sick at home.
- (d) Children receiving treatment in the clinics.

In some cases this procedure necessitates home visits which are regularly done by the nurse, trained teachers and school medical officer, whenever necessary. In the table below is shown the number of cases followed up and the home visits paid:—

- (a) Number of cases followed up .. 1,276
- (b) Number of home visits .. 783
- (c) Monthly variation of the follow-up cases:—

July	1945	..	12
August	1945	..	33
September	1945	..	47
October	1945	..	20
November	1945	..	133
December	1945	..	40
January	1946	..	180
February	1946	..	283
March	1946	..	175
April	1946	..	273
May	1946	..	39
June	1946	..	41

Health education

An attempt is made to inculcate into children a true knowledge of desirable habits. For this purpose, each class receives one hour of 'talk' or 'demonstration' on health every week by the trained teacher, nurse or the school medical officer. The teachers themselves are given such talks every month by the school medical officer. Health habit training booklets with twelve health commandments are being introduced.

Teachers' work

This work is done by the teachers, chiefly the trained ones, assisted by the monitors when necessary.

1. *Daily inspection.*—Commencing the day's work, each class parades and pupils are examined for obvious visible defects, i.e. lack of cleanliness, dirty nails, lousiness, etc. From here cases requiring treatment are referred to the school clinics. The class health monitors assist in daily inspection.

Name of school	Defects observed	Defects corrected	Per cent
European ..	1,233	1,203	97
Indian High ..	17,136	9,053	52
Indian Girls' ..	5,856	897	15
Indian Primary ..	16,420	11,125	67

2. Detection of absentees.—

Absentees	NAMES OF SCHOOLS			
	European	Indian High	Indian Girls'	Indian Primary
Total	1,179	22,029	1,311	2,748
Over 3 days ..	418	1,422	732	322
Due to disease ..	184	336	134	112
Followed up ..	206	131	95	133
Excluded ..	42	785	43	59

Unless a definite record is kept, it is very difficult to reduce the number of absentees.

The teachers also participate in home visits, follow-up, and health education.

Other work has also been taken in hand, such as training of the nurses and teachers.

Conclusion

Properly planned school health services are most essential in this country as the figures have borne out. Recently, in July, the scheme has been extended to include Adra, and it has brought a further 1,400 children under our care.

The first year's working reveals, in bold relief, the poor nutritional state of the school children, both European and Indian, in this country. Our work has shown that 79 per cent of the European children and 84 per cent of the Indian children showed signs of defects, and that with the use of the 'Nutrition Assessment Score Card' no less than 68.6 per cent of the children showed definite signs of malnutrition. It is the considered opinion that the majority of the other defects, particularly dental caries and anaemia, are due to indifferent feeding.

To date it has not been possible to arrange a scheme for the supply of milk and, if necessary, additional food, but this will be essential if improvement in the physical and mental condition of the child is to be effected. It is, however, fortunate that it has been possible to supply the children with multivitamin-cum-mineral tablets which have been very generously given by the American Friends Service Committee, but this is not the solution; the children must receive a well-balanced diet.

There has been a very gratifying response from the parents and the teachers, and undoubtedly they have realized the necessity for health education. This, in itself, has already shown a marked improvement, particularly in the attitude of the child towards life in general.

I wish to acknowledge my indebtedness to the Director, All-India Institute of Hygiene and Public Health, Calcutta, Dr. John B. Grant of the Rockefeller Foundation, and later Lieut.-Colonel C. K. Lakshmanan, for considerable assistance received in working out many of the details of the scheme. I am also indebted to our General Manager and to our Engineering Department for their ready help. To the parents and teachers of the school children I am thankful for their interest in the programme and their gratifying response.

Specimen forms received with this article are omitted to save space.—Editor, I.M.G.

PLATE IX

SPOROTRICHOSIS OF THE SKIN IN INDIA (A NEW SPECIES DESCRIBED) :
D. PANJA, N. C. DEY AND L. M. GHOSH. (O. A.) PAGE 200

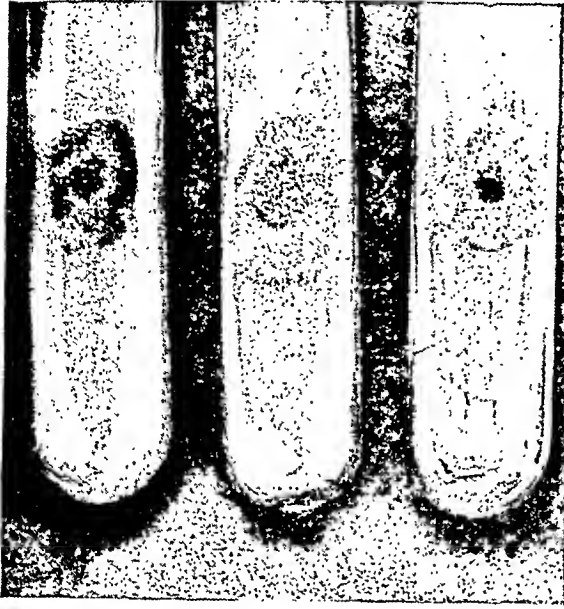


Fig. 1a.



Fig. 1b.

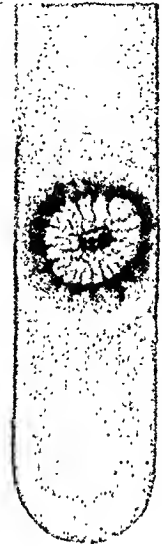


Fig. 1c.

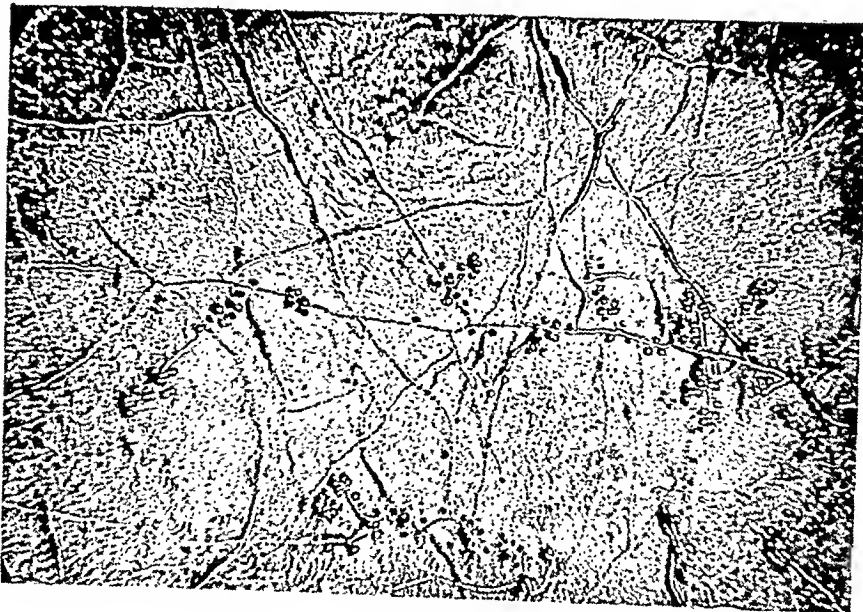


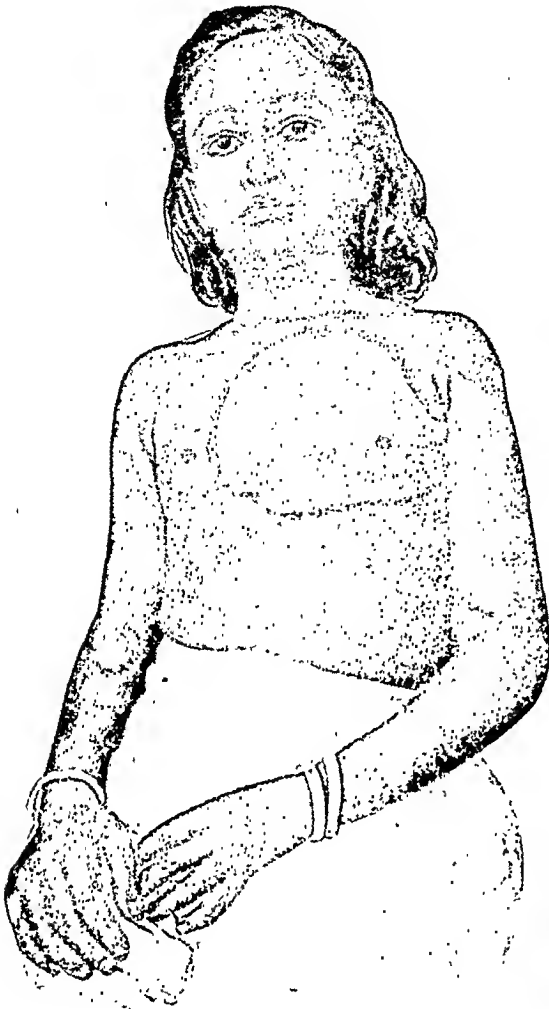
Fig. 2.

Fig. 1.—Growth of *Sporotrichum tropicale* on Sabouraud's medium :
(a) Photograph of two to three weeks' old cultures.
(b) Photograph of a six weeks' old culture.
(c) Drawing of a two weeks' old culture.

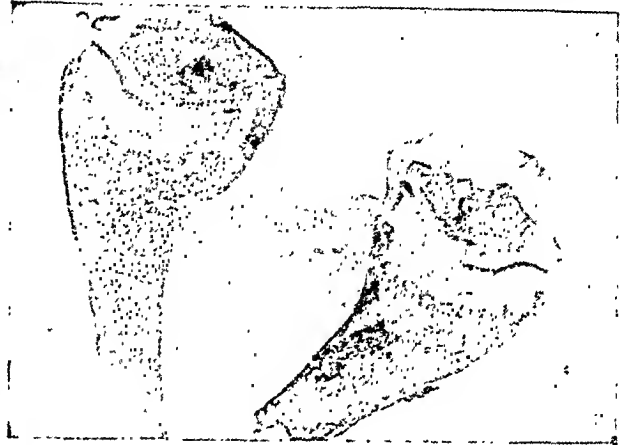
Fig. 2.—Photomicrograph showing hyphae containing conidiospores, isolated or in groups.

Mag. $\times 450$ approximately.

A CASE OF DERMATOMYOSITIS : L. M. GHOSH
& B. K. SEN. (M. H. P.) PAGE 208

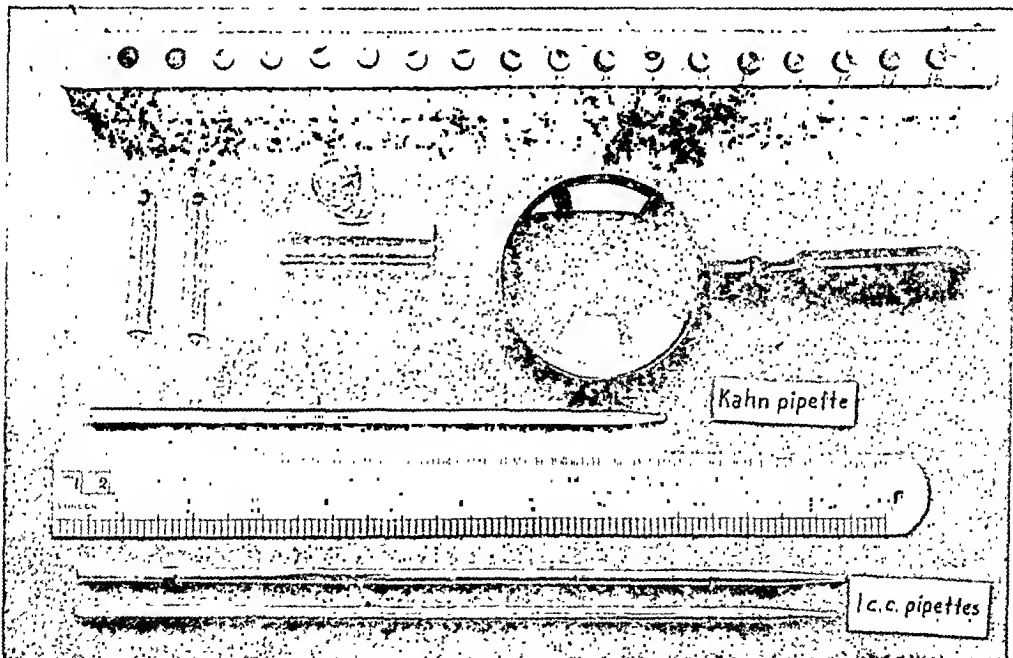


A NOTE ON THE BIOLOGICAL ASSAY OF VITAMIN D IN FISH LIVER OILS : G. KARMAKAR
& M. N. RAO. (P. H. S.) PAGE 223



A specimen photograph ($\times 6$) of the stained bones of the knee joint of a rachitic rat (line test value 1.0).

SEROLOGICAL TECHNIQUE : S. D. S. GREVAL. (O. A.) PAGE 202



Apparatus for Micro-Kahn test for syphilis.

A NOTE ON THE BIOLOGICAL ASSAY OF VITAMIN D IN FISH LIVER OILS

By G. KARMAKAR

and

M. N. RAO

(Section of Biochemistry, Nutrition and Physiological Hygiene, All-India Institute of Hygiene and Public Health, Calcutta)

Introduction

THE biological methods commonly employed for estimation of vitamin D are the 'line test' and the 'ash test'. In the former, the degree of calcification of bones produced in a rachitic rat by the test substance is taken as an index of its vitamin D content, i.e. a 'curative test'. In the latter, the potency of the test substance is taken as proportional to the degree of prevention of rickets in animals

on rachitic diet—a 'prophylactic test'. For both the tests, colonies of rats specifically reared up with low vitamin D reserves are recommended. But our experience in Calcutta showed difficulty in rearing up a large specific stock of young rats for the purpose under the tropical climate. The other alternative for us was to use a colony of rats on stock diet reared up in partial darkness. When these colonies of rats were being used it was often found that the degree of extreme rickets that is wanted in the curative or line test did not satisfactorily develop. Moreover, the values of the line test in the same group of experimental animals varied to a considerable extent. The values of the healing in the line test are liable to variation not only because of the biological material but also due to personal error in quantitative assessment of healing. We therefore wanted to try with the stock of available rats the efficacy of the

TABLE I

Line test

A	B	C	D	E	F	G	H
Number of drops of oil*	Vitamin D I.U.	Log of dose	Preparatory period : days	Experimental period : days	Serial number of rats	Degree of healing†	Average degree of healing
STANDARD OIL							
24	9.3	0.97	29	10	1	4.0	3.66
					2	3.5	
					3	3.5	
12	4.65	0.67	29	10	4	3.0	2.92
					5	3.0	
					6	4.0	
					7	2.5	
					8	2.5	
					9	2.5	
2	0.78	1.89	29	10	10	0.25	0.55
					11	0.25	
					12	0.25	
					13	0.25	
					14	0.25	
					15	0.25	
					16	1.00	
					17	1.00	
					18	1.50	
SHARK LIVER OIL							
24	Unknown	..	29	10	19	2.25	1.88
					20	1.5	
12	Unknown	..	29	10	21	0.75	0.88
					22	0.75	
					23	1.0	
					24	1.0	

* With the fine needle dropper used, 160 drops of standard oil make 1 c.c. and is equivalent to 62 I.U. of vitamin D. 180 drops of shark liver oil make 1 c.c.

† The numbers indicate the degree of healing in a scale in which 0 indicates full rickets and 6 indicates maximum calcification.

alternative ash test in which the accurate percentage of ash is taken as the criterion instead of the healing values of line test wherein the personal error is likely to vitiate the results.

Experimental

The following rachitogenic diet used by us was a high calcium and low phosphorous diet :—

Rachitogenic diet

	Per cent
Yellow maize (powder) ..	60
Whole wheat ..	25
Gelatine ..	10
Calcium carbonate ..	4
Sodium chloride ..	1

Young rats weighing about 30 gm. were kept on the above diet for 4 weeks in complete darkness. During this preparatory period the rats were weighed twice a week and also the amount of food consumed daily was weighed to detect any loss of appetite which is supposed to lead to spontaneous healing of rickets. After making sure that all the animals developed complete rickets by doing a line test on some of them the rats were divided into five groups : three groups on graded doses of standard oil and the fourth and fifth groups on oil of unknown potency. The test period was for 10 days and the oil was given in 2 doses. The results are given in table I.

Values of average healing (column H) are plotted against the logarithm of the doses (column C) and a mean curve is drawn through them.

From this curve the abscissæ are found out corresponding to the average healing for the shark liver oil, and the values are calculated in table II.

TABLE II

Dose in drops	Average healing	Abscissæ	Antilog of the abscissæ (represents the vitamin D content)	Vitamin D (I.U./c.c.)
24	1.88	0.32	2.1	15.8
12	0.88	1.97	0.93	14.0

Starting with this oil of known potency an ash test was done on a group of 22 rats obtained partly from the laboratory stock and partly from the market. The rats were divided into four groups, two for feeding the standard oil and two for the shark liver oil and the doses were given from the beginning of the experiment. The doses selected were within the limit of prophylactic doses, i.e. one-fifth of the curative dose and even less and therefore one would expect partial calcification of the skeleton. The feeding was continued for about 7 weeks after which the animals were killed and the skeleton separated from the rats by the method of

Subrahinanyan, Duckworth and Godden (1939). The method consists in removing mechanically as much of the soft parts from the skeleton as possible and subsequently incubating the skeleton with papain to digest the remnants. By this method it was found that even the intervertebral ligaments are digested and the vertebræ are loose.

The short bones, the vertebræ, the small bones and the long bones of each of the animals are preserved separately for ashing to find any relative differences. The ashing to a constant weight is done after extracting the bones in alcohol and ether for 6 hours to remove the last traces of fat. The results of the analysis are given in table III.

TABLE III

Ash test

Total dose of vitamin D given during the whole experimental period	Average percentage ash (of the entire skeleton)
STANDARD OIL	
30 drops (11.6 I.U.) ..	59.06
60 drops (23.2 I.U.) ..	59.40
SHARK LIVER OIL	
60 drops (5 I.U. as found by line test)	59.09
120 drops (10 I.U. as found by line test)	59.26

Conclusions

Table III shows that irrespective of the graded doses of vitamin D the percentage ash is uniformly constant signifying that there has been spontaneous healing of rickets. Probably, the greater time that is taken for the ash test, i.e. nearly 8 to 10 weeks, was responsible for the spontaneous healing. But in the case of the line test the shorter time gives lesser chances of spontaneous healing. Hence the line test appears to be the test of choice whenever the specific stock colony of rats cannot be reared up for any reason. The line test is used as a routine in this laboratory.

The method of reporting the results with line test from this laboratory may be of interest. The values allotted to the degree of healing depend purely on personal judgment. To avoid this personal error the ends of the bones are all enlarged and photographed. This facilitates not only a permanent record but of check up by different workers. The specimen is mounted on a flat white surface and illuminated with two 50 watt Philips photographic lamps at such angles (about 45°) as to avoid

any dark shadows. The camera (Contax II with Sonnar 1.5 lens) is mounted on a universal stand and Zeiss micro-enlarger $\times 2$ used for magnification. A sample photograph is annexed (see plate X).

In this connection it may be mentioned that during our estimation of vitamin D content of different food samples by the line test we could not produce complete rickets on rats purchased from the market (weighing 25 to 30 gm.) when we kept them on the rachitogenic diet for even 6 weeks or more. This shows that unless the animals are bred in the laboratory on a restricted diet it is useless to attempt the line test method for the estimation of vitamin D. The ash test mentioned on the other hand is in our experience a failure in a hot climate although the animals are bred in the laboratory.

Summary

The rearing up of a specific stock colony for vitamin D assay in a tropical place like Calcutta is difficult. When the stock is not quite satisfactory ash test is not of much value. The line test is the test of choice.

Acknowledgment

The work was undertaken under the direction of Dr. G. Sankaran, Professor of Biochemistry, Nutrition and Physiological Hygiene. We sincerely thank him for his co-operation and guidance.

REFERENCE

SUBRAHMANYAN, V., DUCK-*Biochem. J.*, **33**, 1421.
WORTH, J., and GODDEN,
W. (1939).

The Indian Medical Gazette Fifty Years Ago

MALARIA AND IMMUNITY

(Reprinted from the *Indian Medical Gazette*, Vol. 32, April 1897, p. 141)

It is only press oneself in general terms the liability of any given person to any infectious disease. On all sides we see instances in which the apparently feeble escape, while those who seem best fitted to combat the inroads of disease are struck down. The question of individual immunity from disease, together with that of the powers of individual resistance, forms a most interesting study, and the theories at present arrived at, though not strictly conclusive on all points, are satisfactory to a certain extent and help us to solve some of the difficulties regarding personal antagonism to attacks on the part of disease germs.

So far we are of opinion that we may safely say that in all cases those who depart most, in whatever way, from the ideal standard of bodily health will be most likely to suffer from malarial infection, and that, in those who appear to be

in perfect health and yet suffer, the perfection is only apparent; there is something or other below par. The liability to contract malarial diseases is very marked among strangers visiting a malarious district for the first time, and this liability is often increased when such persons, ignorant of their danger or careless in the joy of health, do not take proper precautions to minimize the possibility of infection. They may be travellers, explorers, surveyors or soldiers who are living somewhat below their ordinary habit as regards food and dwelling accommodation. They are incurring unusual fatigue both of mind and body, and it is at such times that they will fall victims to malaria. The watch-dogs of the body share in the general weariness, and the enemy enters into possession. Conditions, such as excess in eating or drinking, long abstinence from food, dyspepsia, diarrhoea or 'chills' from wet clothing or wet feet will predispose the individual to attacks of malaria; as will also undue exposure to a hot sun. Certain races are said to be more or less immune and able to dwell in malarial regions with impunity. The negro resists malaria, and the aborigines of certain countries seem also to dwell in the midst of alarms in comparative safety. Writing of Nepal, Captain Eden Vansittart mentions certain tribes dwelling in most malarious spots in the Nepal terai, which apparently suffer little inconvenience from their malarial surroundings. Darwin accepted the undoubted differences, in constitution, in powers of acclimatization and in liability to certain diseases, among the various races of mankind. He says regarding the negro: 'They likewise escape to a large extent the fatal intermittent fevers that prevail along at least 2,600 miles of the shores of Africa, and which annually cause one-fifth of the white settlers to die and another fifth to return home invalided. With the negro the immunity, as far as it is the result of acclimatization, implies exposure during a prodigious length of time . . . and the Revd. H. B. Tristram states that there are districts in Northern Africa which the native inhabitants are compelled annually to leave, though the negroes can remain with safety'.

Individuals of a race thus immune may, however, lose their 'protection' by long residence in non-malarious countries, and we frequently find negro sailors in the port of Calcutta suffering from malarial fever. As for the Hindus and Mohammedans of Bengal there is, as a rule, no immunity, and they suffer quite as much as Europeans settled, or working, in the country. Some may, and apparently do, acquire a certain tolerance of malaria; but this tolerance, so far as we can see, never extends to protection from mild attacks or continuous deterioration of constitution. It may be that in many persons the tolerance is only a deadening of the system to the irritation produced in its tissues by the *plasmodium malariae*. The poison of malaria is not contagious; but there is some reason to

believe that the foetus *in utero* may be infected from the maternal blood should the parent suffer from *malarial fever* during pregnancy.

The inherited results of acclimatization in *malarial* areas through long ages may, therefore, give some power of resistance to the individual, and, conversely, those who have no such inheritance, will be the more liable to suffer from *malaria*. Even among the latter it is a matter of common knowledge that one person resists disease better than another, and we must seek some reason for this difference. Setting aside the question of prophylactic precautions, the value of which in diminishing our liability to disease is self-evident, have we anything within us which guards us against the attacks of bacteria, and protozoa such as the *amœba* of *malaria*? The liability to serious disease will no doubt vary with the amount of active poison imbibed, but with such quickly multiplying bodies as the *plasmodia*, a very small amount must suffice when the individual is in poor health. The studies of Metchnikoff have shown that there are certain leucocytes, often called 'phagocytes', whose duty seems to be that of seizing and destroying bacteria or other poisons entering the circulation through any of the *viæ naturales*. These phagocytes no doubt attack the *plasmodium malarie* in the lungs, œsophagus and intestinal canal, as well as in the circulation, and when in full vigour, or when dealing with only a small number of enemies, seem able to defeat them. These cells will naturally share in any illness or weariness of the body, and at such times man offers an easy prey to parasitic foes. The action of these leucocytes is treated at length in a work, by Gaston Chatenay, to which we refer the reader. It must be noted here, though well known, that the *plasmodia* of *malaria* do not form any *antitoxins* in the body, and their presence confers no promise of reduced liability in the future but rather the reverse. Herein they differ from most of the bacteria which seem to do us an unconscious kindness in producing substances and states of body which for a time protect us from further attacks of a like nature.

We cannot do better than close this article with a quotation from a lecture by Dr. G. Sims Woodhead. His remarks immediately concern protection from the attacks of tubercle bacilli, but apply with equal force to other diseases: 'It has now been very generally accepted that passing to and from the patches of lymphoid tissue in the walls of the alimentary canal, into and out of the canal itself, are numerous leucocytes, amœboid cells, or lymphoid corpuscles, as they are sometimes called. Further, it has been demonstrated that these small cells have the power of taking up foreign particles and of digesting them, or of so transforming them that unless they consist of particles of pigment they disappear; amongst these foreign bodies may be numbered bacteria of various kinds; so numerous, indeed, are bacteria in this position at certain periods of digestion that, by

the use of proper staining methods, they can be readily demonstrated lying in the bodies of the leucocytes, whilst these small cells, in turn, with their contained micro-organisms, may be seen lying embedded in the large epithelioid cells of the lymph tissue. These observations are so readily made out and have been so repeatedly confirmed, and the appearances presented are so very similar to those described by Metchnikoff as occurring in connection with the phagocytosis carried on by the leucocytes of the circulation, that very naturally the two processes have been compared and a phagocytic function has been assigned to the lymphocytes of the tonsils and to the cells of the adenoid tissue of the lower reaches of the intestinal canal'.

LONDON LETTER

(Reprinted from the *Indian Medical Gazette*, Vol. 32, April 1897, p. 145)

THE attitude of the people of India in the face of the drastic measures which the Government has been compelled to resort to in order to stay the spread of plague is wonderful. Never in the whole history of British rule in the East has the subject been subjected to such uncompromising interference with his liberty—with his personal movements, his domestic privacy, his prejudices and cherished traditional customs. Evacuation of dwellings, forcible cleansing or destruction of these, removal of the sick to isolation hospitals, inspection and detention of travellers—these and similar proceedings must to a sensitive, exclusive and conservative race be most unpalatable and irritating, and yet they seem to be submitted to without a murmur. Even the strongest religious feelings are lacerated, as by the prohibition of the Mecca pilgrimage, and the Mohammedans who are not prone to suppress their sectarian fervour, manifest no resentment. Further, the municipal institutions which were established for the purpose of educating communities in governing their own affairs, and which were intended to entrust a measure of political responsibility and power to the masses, have been somewhat roughly handled, and as in Calcutta and Bombay the Government has interfered to supersede their slow, halting and niggardly efforts by instituting agencies empowered to act more vigorously, thoroughly and liberally, and no loud voice of protest is raised to condemn the rude tyranny of the foreigner. The fact of the matter is that the crisis is a serious one, and Indian populations feel it to be so; and while the strong steps which Government has been compelled to take in order to save life and avert disaster, vital and commercial, are acquiesced in by the victims of the plague and its attendant panic, the propriety and necessity of them is fully and admiringly acknowledged by the rest of the civilized world. At the same time that a British Government is compelled to do things

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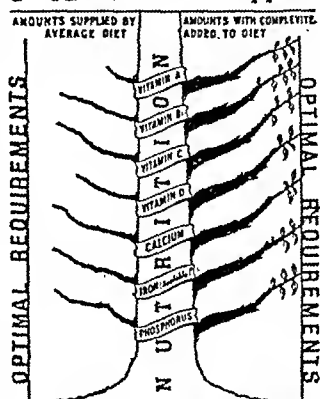
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1. Vogt-Moller, P., Tier. Rund., 1942, 46.

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Fig. 1

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Fig. 2

Gypsona bandages. After three weeks the plaster was removed and three days later the flap was divided. In two months the flap was completely healed and the patient discharged. The details and illustrations above are of an actual case. T. J. Smith & Nephew Ltd., of Hull, England, manufacturers of Elastoplast, Jelonet and Gypsona, publish this instance—typical of many in which their products have been used with success.

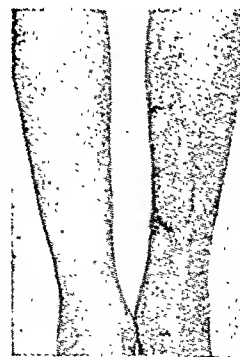


Fig. 3

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in India which are calculated to irritate and annoy Indians, a generous British public has contributed nearly half a million of money for the relief of the Indian famine which now appears to be in its acutest stage. I was present last night and took part in a discussion on Sanitation in India at the Parke's Museum under the auspices of the Sanitary Institute. It was opened by an interesting paper by Mr. Baldwin Latham, which, as might be expected, dwelt prominently on the importance of executing sanitary works for supply of water and sewage removal in cities and towns. The peculiar difficulties which existed in India with its high temperature and heavy rainfalls and dead levels, and the means necessary to overcome them were clearly and shrewdly dwelt on. The subsequent speakers diverged into a number of cognate matters, and the subjects of sanitary education, village sanitation, and utilization of excreta as manure were prominent among these. One speaker contended that the native Indian, though much has been said and written to the contrary, is not uncleanly in his instincts and ways according to his light, that in matters of personal and domestic cleanliness, he was scrupulously, elaborately, laboriously cleanly, in fact that the whole centre system was a protest and precaution against contamination. The instinct of cleanliness being there, it only required education to ensure its proper direction and application. This view seemed to commend itself to the meeting. As regards sanitary education, it was suggested that this ought to be an integral and essential element in the teaching and training of the young in schools. This is well as far as intellectual knowledge goes, but social education as regards the home, the village, the town, the city is also needful, and this cannot be imparted practically and usefully in schools. It is here that the active enlightened Government comes in to supplement and apply book-knowledge. Sanitary administration and sanitary work are the means to the end of social sanitary education. It is in this matter of concerted, associated action to sanitary objects that, as I recently pointed out, the social codes and social customs of the natives of India are deficient, and it is to the purpose of supplying this deficiency and creating salutary habits of common life, that the efforts of Indian administrations have been and must continue to be devoted.

There was a strong feeling in the meeting that the village life of India must not be too rudely disturbed, and that customs which are sanitariously harmless or even beneficial, such as the early morning resort to the field or bush, must not be interfered with even though they differ from those of western nations. The restoration to the soil for the useful purposes of material derived from the soil is a rational process, and, when carried out with proper precaution, a safe and profitable proceeding. But there are matters in rural India which do

demand intervention, and the condition of drinking and cooking water is assuredly the chief of these. On the question, Mr. Baldwin Latham was very strong, and he detailed with satisfaction many illustrations of the benefit of health which had followed arrangements for the supply of such water to Indian communities. The subject of several diseases in the European Army of India is being taken up with vigour. There are to be debates in both Houses of Parliament at an early date on the question. Lord Onslow's Committee has, I believe, completed its inquiries and is busy preparing its report. The Army Sanitary Commission has delivered a strong pronouncement in favour of active preventive effort; an influential meeting was held recently at the United Service Institution where the subject was warmly discussed for three hours, and as a result a committee has been organized of persons interested in the question to promote the adoption of measures calculated to reduce the amount of suffering and disability caused by these maladies in the army. What the outcome of all this agitation will be it is difficult to predict. These diseases were somewhat arbitrarily removed from the list of contagious affections for whose prevention regulations could be framed in India under the laws, and it is probable that they may be restored to the list, and means of detection and segregation, combined with medical and moral treatment, resorted to. The extent to which constitutional infirmity is caused in civil life among the rising generation by the marriage of syphilitic soldiers after their discharge from the army is clearly occasioning alarm.

In Russia there was a commission not long ago which sat for the purpose of investigating the extent to which syphilitic disease was sapping and degrading the national health. Very stringent and searching ordinances were recommended, with a view to the detection of disease in both men and women in civil as well as in military life, and the detention in hospital of persons dangerous to the common welfare until they ceased to be so. It is on this principle that other communicable maladies are recognized and treated, and although the circumstances are in the case in question peculiar and difficult, the policy of blind inaction appears to be getting discredited in this country.

Current Topics, Etc.

Son or Daughter ? *

By K. A. SHAH, M.B., B.S.

Ranchhodlal Dispensary, Ahmedabad

Of all the peoples in the world, perhaps the Hindus alone believe that a son saves them from hell.

* A paper read before the Ahmedabad Medical Society on 21st December, 1946.

Nevertheless, mankind has, down the ages, always desired a male issue. If the Kings want heirs to their thrones, the aborigines want warriors to fight their battles and workers to till their land. No wonder then that speculation has been rife and fertile as to what determines the sex of the foetus *in utero*, and as to whether anything can be done to influence it.

According to the *Encyclopedia Britannica* (9th Edition), there were hundreds of theories current in the 17th and 18th centuries. Some of these had to do with the quality or quantity of food, some with elevation of abode, some with conditions of temperature and some with the age of parents, their mode of life, habits, rank, etc. For example, overfeeding the mother was thought to result in a girl, underfeeding in a boy. The older parent was supposed to impress its own sex upon the offspring by some, while others held that the younger parent, in cases where there was a marked disparity in ages, induced its own sex in the offspring. It is believed in Southern France and Italy that the wearing of a hat at the time of intercourse is a means to begetting a son, while in Poland the wearing of Sunday clothes on this occasion is held to have a powerful influence. In other places faith is placed in the wearing of boots at mating time (Sandell, 1937).

A belief which has remained unshaken for many centuries is that if the woman has been sufficiently roused to a complete orgasm at the time of intercourse the result will be a male child (Sandell, 1937). It appears that this was perhaps the secret of the successful prediction which Louis-Philippe, King of France (in the nineteenth century), could make about the sex of his unborn children. When asked how he could do so, he replied, 'When I wish a girl, I offer her to the Queen; when I wish a boy, I expect that she offers him to me.' Shakespeare (Erskine, 1925) wrote, 'A man who goes to bed drunk begets a daughter'. Albertus Magnus, in the 13th century, advised, 'Lie on the right for a boy, on the left for a girl'. The theory that the male parent had no influence on the sex of the embryo was announced by Rumley Dawson about 40 years ago. Erskine (1925) informs us that in France brides are seriously advised to sleep on the right side if they desire sons (quoting in support *Lancet* of 1870). Behind these precepts is the belief that the right ovary produces male ova only, and the left, female ova. Blakely knew of a patient who had twins, a boy and a girl, after unilateral oophorectomy (quoted by Clifford White, in the *Medical Annual*, 1939, p. 395). In her book written in 1929, Erskine states, 'The theory that the sex of a child is fixed before the ovum is fertilized has now become an absolute certainty as a result of thousands of successful tests which have established it. The male according to science is not a sex-determining begetter: he is simply and only a fertilizing agent.' As we shall see, the truth is the other way about.

According to Dhanvantari, *Shukra Bāhulyāt Pūmān, Ārtava Bāhulyāt Stree*, a son is born when there is excess of semen; a daughter, when the vaginal secretion is in excess. This almost anticipates Unterberger's theory. The *Pāraskar Grihyasūtra* recommends that one desirous of a son should go to his wife daily: *Putrakāmo Abhigacchhet Nityam*. A more definite instruction is *Putrārthee Yugmadine Kanyārthee Ayugmadine* to have intercourse on even days for a son, and odd days for a daughter; and the time recommended as most fruitful (which is in conformity with modern scientific conceptions) is first sixteen days [counting from the beginning of menstruation].

The sex of the foetus, as we know to-day, is determined at the time of conception; and the determining factor is the spermatozoon and not the ovum. Like all hereditary characters, sex is also determined by chromosomes. Pathak believes that the ancients had this knowledge about chromosomes and cites the following from Charak: *Yasya Yasya Avayavasya Beeje, Beejabhāga Upatāpto Bhavati, Tasya Tasya Avayavasya Vikrutir Upajāyate*. In my opinion,

Pathak is mistaken. What is here meant is something akin to Darwin's 'Gemmules'.

In 1891 Henking had observed that in the spermatogenesis of a bug, the sperms are of two kinds distinguished by the presence or absence of a certain chromatin element. In 1899 McClung identified the differential element as a chromosome. It was then established that there are two classes of sperms in equal numbers with one chromosome—the X-chromosome—as a differential. McClung (1925) advanced the theory that this chromosome determines sex. A startling theory such as McClung's did not have to wait long before being tested. Cytologists began to turn their microscope on the cells of the male and female of various species. In most species the females have an even number of chromosomes, including two X-chromosomes, whereas the males have only one X-chromosome in some species and in others (including man) the single X-chromosome is accompanied by a smaller chromosome, the Y-chromosome. In 1918, Painter showed that the unreduced or duplex number of chromosomes in the testis of Europeans and Negroes is 24 pairs of which one pair is unequally mated (the unequal pair being XY). Consequently when reduction occurs the chromosomes separate out in two sets, 23 autosomes + X and 23 autosomes + Y. Thus two sets of spermatozoa are formed—half carrying the X-chromosome and half carrying the Y-chromosome. Later, Evans and Swezy (1928) confirmed Painter's work on the male and demonstrated that the female of the human species has an equally matched XX pair (Hogben, 1931). All the ova therefore carry one X-chromosome.

We have seen that the sperms contain X and Y chromosomes in equal numbers. Sperms with X when they combine with an ovum give females (XX), while those with Y give male offsprings (XY). Observations in the fruit fly have shown that it is the lack of one X that gives rise to a male; the Y-chromosome is not necessary to produce a male.

Is it possible, once the conception has taken place, to forecast the sex of the child? It was suggested 80 years ago that before labour a foetal heart rate of 124 or less indicated a boy, whereas that of 144 or more a girl. It is difficult to believe that there exists a difference of this kind when throughout the whole life the sexes do not show such a difference. In any circumstances comparatively few foetal hearts are below 124 or above 144 before labour commences (Blakely, S. B., quoted by Clifford White in *Medical Annual*, 1939, p. 395). In 1934 Davis of Boston injected testicular extract into the skin of pregnant women and noted the reaction of the skin in four to ten minutes. Entire absence of reaction indicated a female, and a marked positive reaction, characterized by temporary local redness, a male. Davis' results showed 85 per cent accuracy in 534 cases examined. I have not come across any confirmation of this report.

Male sex hormone (androgen) can be extracted during pregnancy and it is thought that the amount excreted has some relationship to the sex of the foetus. Thus, according to Goecke, in instances in which the foetus is male, androgenic substances are found in the urine in 80 per cent of the cases (1 comb unit in 3 litres of urine). On the other hand, in case of a female foetus, no hormone is excreted since, according to this author, it is apparently stored, unused in the placenta (Wolf, 1939).

According to the Egyptians (about 3,500 years ago), 'To tell if a woman is pregnant or not pregnant barley and wheat are moistened with a woman's urine daily like dates or pastry in two bags. If they either germinate, so will she give birth; if the barley germinates, so will it be a boy; if the wheat germinates, so will it be a girl; if they do not germinate, then she is not pregnant'.

A German scientist set out to test this theory. His observations on a hundred women enabled him to make a correct diagnosis of the sex of the embryo in eighty women. Two American workers who repeated their experiments on a large scale in 1935 were, however,

unable to corroborate this, and came to the conclusion that the method is unreliable.

Writers on Ayurveda also describe certain signs by which the sex of the foetus can be discerned: 'If the right eye of the pregnant woman is heavy, if the right breast secretes milk earlier, if the right thigh is more full and her face lustrous, if she yearns after and dreams of objects of the male gender, or dreams of flowers like the lotus or fruits like the mango, her baby is likely to be a boy'. The contrary signs indicate a girl.

According to popular beliefs the pregnant mother of a boy has a more prominent front than behind: eats less and yet is more active and has a lustre on her face. The pregnant mother of a girl, on the other hand, has a figure more prominent at the back, eats more and yet is apathetic: she yawns frequently and has a dull look.

Is it possible in some way to so influence the male (i.e. the Y-bearing) sperms that they will win the race in reaching the ovum in the uterus?

According to the ancients, so long as the embryo remains undifferentiated (say, in the first two months), attempts should be made to turn it into a male. This process or ceremony is called *Punsavan*. It is one of the twelve (or sixteen) *Samskaras* or sacraments of Hindu life. Over and above the performance of religious ceremonies, it is recommended that the juice of certain plants, e.g. *Solanum xanthocarpum* (*Laxmana*), *Sida cordifolia* (*Sahadeva*), or the young buds of the banyan (*Vatashunga*) tree, be dropped into the right nostril (for a girl, in the left). Vagbhata writes that strong and vigorous human effort can sometimes overcome Destiny and recommends that a small male figure made of gold or silver or iron be put in some milk and that milk be given to the pregnant mother.

This figure should be made red hot in the fire and then put in milk. The time should preferably be when the moon is in the *Pushya Nakshatra*. Arundatta, a commentator of Vagbhata writes, however, that if the foetus has already been of the female sex, no human effort can convert it into a male, and the process of *Punsavan* is useless.

About a year ago in the *Journal of the Indian Medical Association*, Dr. P. C. Bose wrote that, at the gynaecologists' conference at Amsterdam in 1938, 'Many speakers reported remarkable results of widely divergent methods in voluntary determination of the sex. Billman treated 31 cases according to Unterberger's method which relies on the theory that the sex of child is fixed at conception and depends on the chemical reaction of the interior of the vagina, alkalizing which causes the development of the male child.'

Unterberger treated sterility in cows by douching with bicarbonate of soda and obtained very successful results. He then applied the method to sterile women and found that in the successful cases the children born were invariably boys. He went a step farther and applied the method to 74 women who hitherto had given birth exclusively to two, three or four girls each. He treated the vagina by alkaline douching before intercourse took place, and success again followed; a series (number not stated) of boys were born. Paul Weill of Strasbourg treated 150 women for sterility by rendering the vagina alkaline. Half of these women, that is 75, conceived as a result of this treatment and the child was a boy in every case. He also treated a number of women who hitherto had given birth to two to three girls each. In all these cases boys resulted. I must admit these are impressive figures. But equally impressive, if not more, were the figures presented by Schöner at the Third Sexual Reform Congress held in London in 1929. He set out to establish that the right ovary produces more boys than girls, and the left more girls than boys, and both in the same proportion (2 : 1). He arrived at the conclusion ('unambiguous') that 'it is not the sperm but the ovum which determines the sex', and that 'the extra chromosome is not responsible for the determination of sex' (Wolf, 1939). We know to-day that he was wrong.

McPhee and Eaton of the Bureau of Animal Industry of the U.S. Department of Agriculture carried out an extensive investigation 'to determine whether the sex ratio can be altered significantly either by douching the female with acid and alkaline solutions or by changing the pH of semen used for artificial insemination'.

Experiments were conducted on rabbits and swine. In all, 2,383 rabbits and 219 swine were born. The results failed to show any significant modification of the normal sex ratio for the species as a result of the acid and alkali treatments (McPhee and Eaton, 1942).

In the Department of Genetics of Wisconsin University, Casida and Murphree carried out a similar experiment *in vitro*. They treated rabbit sperm with solutions of sodium bicarbonate and lactic acid and used these sperms for artificial insemination. No significant disturbance of sex ratio of the offspring was produced by either of these treatments. 'Additional trials with sodium bicarbonate in which tests were made of its effect upon the speed of travel and upon the survival of the male and female determining sperm failed to show any differential effect' (Casida and Murphree, 1942).

Quisenberry declares, '... douching of farm animals to modify the sex ratio seems not only a hopeless procedure, but a dangerous one as well' (Quisenberry, 1945). His results are worth quoting. By using the lactic acid douche, which is supposed to give female offspring mainly, if not solely, 51.6 per cent males were born; whereas the use of sodium bicarbonate which is supposed to facilitate male births gave rise to 54.5 per cent of males only!

There is at least some difference between the Y-bearing and the X-bearing sperms. The Y-bearing sperms have smaller heads (by 1/1,000th of a mm.) and it was suggested by Huxley that the two types be separated by some such process as centrifuging, and the sperms used for artificial insemination to ensure the birth of the desired child. So far as I know, this ingenious suggestion has not been taken up. Another difference between the Y-bearing and X-bearing sperms is that the former are somehow or other able to reach the ovum much more quickly than their fellows. It is recorded that many more males are conceived than females. Scheinfeld and Schweitzer (1939) report that in early abortion (about 3 months), the males outnumber the females almost four to one. In the fourth month, aborted males are double those of females, in the fifth month 145 males to 100 females, in the next four months the proportion drops further, but just before birth there is a rise to almost 140 males aborted (or still born) to every 100 females. Even at birth the preponderance of males over females continues; there are 105 males born to 100 females. Similar figures for our own city, in 1945-46, are 107.2 males for every 100 females.

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Sulphaguanidine in the Treatment of Cholera Under Rural Field Conditions

(From a paper by Dr. S. C. Seal read at the Indian Science Congress, 1947)

RECORDS of the trials of sulphaguanidine in the treatment of cholera are all based on studies of cholera cases admitted into hospitals where the patients are generally brought in in an advanced stage of the disease and treatment is carried out under controlled conditions. The effect of the drug when applied under actual field conditions in which both the community and the environment remain uncontrolled was considered worth studying. Opportunities were available for such trials in several small outbreaks of cholera occurring within the Singur Health Centre Area in the district of Hooghly, Bengal. The drug was supplied by the Director, School of Tropical Medicine, Calcutta, and the actual work was carried out by Dr. S. C. Seal, M.B., D.P.H., Assistant Professor of Epidemiology, All-India Institute of Hygiene and Public Health, Calcutta, with the help of Mr. Purnendu Chatterji, Field Supervisor, Gastro-Intestinal Disorders Inquiry under the Rockefeller Foundation. We have received Dr. Seal's report on this work.

Thirty small outbreaks of cholera involving 29 villages were investigated during the period between middle of August 1944 and middle of September 1945. There were altogether 290 cases affecting all age groups, females preponderating over males. The gross fatality rate was 24.5 per cent, both sexes contributing almost equally. One hundred and thirty-four cases were treated with sulphaguanidine (group A) with only 2 deaths and 154 cases by other methods (group B) with 67 deaths. The fatality rate is thus 1.5 and 43.5 per cent respectively. The difference is obviously highly significant. The mortality rates among the moderate and severe cases were respectively 1.9 and 2.6 per cent in group A against 18.5 and 70.2 per cent in group B. The statistical analysis of the data in relation to the various factors which influence the results of treatment indicate a definite superiority of sulphaguanidine over other treatments.

The dosage used for a clinical cholera case (adult) was generally as follows: Initial dose—3 grammes followed by 3 or 2 grammes every 3 or 4 hours (repeated immediately if vomited out) till the number of stools is reduced to 2 or less per day, then one gramme every 6 hours for the next 24 hours. The drug is better used in powder form. The total average dose varied with age, severity and time of commencement of treatment. The highest total dose in mild cases was 14 grammes, in moderately severe cases 25 grammes and in severe cases 28 grammes, the gross average being about 10 grammes exclusive of supplementary measures. No complications or toxic symptoms developed in cases treated with this drug.

A Simple Method for Performing a Wassermann Test on Anticomplementary Serum

By ALBERT TARAN, B.A.

(Abstracted from the *Journal of Laboratory and Clinical Medicine*, Vol. 31, No. 9, September 1946, p. 1037)

A SIMPLE procedure has been given which permits the performance of a Wassermann test on anticomplementary

mentary serum and which eliminates the necessity of taking further specimens of blood from the patient.

The procedure is based on the saturation of the serum with undiluted complement to satisfy the 'fixing' properties of the serum. To 2 c.c. of anticomplementary serum is added 0.3 c.c. of undiluted complement and placed in 37°C. water bath for thirty minutes and in 56°C. water bath for thirty minutes to destroy excess complement. The Wassermann test is performed in the usual manner.

In all cases complete hemolysis was present in the control tube, and the tests were reported as negative, doubtful, and positive.

Known negative and positive sera were treated in the same manner as the anticomplementary sera in order to check on the effects of complement saturation. The results of these tests were the same with and without complement saturation.

There were excellent correlations between the Wassermann test on anticomplementary serum and the repeated Wassermann test on fresh serum and the Kahn test.

A. B. R. C.

Present Status of Diasone in the Treatment of Leprosy: Brief Clinical Note

By G. H. FAGET

R. C. POGGE

and

F. A. JOHANSEN

(Abstracted from the *Public Health Reports*, Vol. 61, No. 26, 28th June, 1946, p. 960)

FAGET and co-workers at the National Leprosarium, Carville, La., summarize the results in 104 patients of leprosy treated during the past 2½ years with diasone which is a derivative of diamino-diphenyl-sulphone. In all cases the drug has been used by mouth in daily doses varying for adults from 0.33 gramme to 1 gramme and for children from 0.17 gramme to 0.5 gramme.

In about 30 per cent cases the treatment had to be discontinued because of toxic reactions or other causes, in about 7 per cent the treatment has been carried only for less than 6 months, and in the remaining 63 per cent cases (66 cases) the treatment has been carried for 6 months or longer. Of these 66 cases there is objective improvement in specific leprosy lesions in 65 per cent of the patients; in another 12 per cent the improvement is limited to changes in various non-specific infections which appear to benefit from diasone therapy; in the remaining 23 per cent the improvement is largely subjective and no demonstrable change is claimed; there are no cases that are clinically worse. The authors conclude that diasone is suitable for oral administration and that patients with leprosy usually improve clinically within the first six months of treatment on a dose of 1 gramme daily for the adult.

D.

Promizole Treatment of Leprosy: A Preliminary Report

By G. H. FAGET

R. C. POGGE

and

F. A. JOHANSEN

(Abstracted from the *Public Health Reports*, Vol. 61, No. 26, 28th June, 1946, p. 957)

FAGET and co-workers at the National Leprosarium, Carville, La., have presented a preliminary report on the treatment of leprosy with promizole which

is a derivative of diamino-diphenyl sulphone-diamino-5-thiasoliphenyl sulphone. Promizole is less toxic than promin which is another derivative of diamino-diphenyl sulphone, reported on favourably in the treatment of leprosy. The present report is a preliminary report based on 7 cases treated for a period of at least 1 year. Originally, treatment was started in 11 cases; in 4 it had to be discontinued, in two patients because of the toxic reactions, and in another 2 for other reasons. The treatment was started with a dose of 0.5 gramme given three times daily, the dose was gradually increased to 2 grammes given three times daily over a period of several weeks. All the 7 patients have tolerated the drug well in doses up to 6 grammes daily. At the end improvement has been seen in all the 7 cases. The authors conclude that promizole is well tolerated by patients with leprosy and that clinical improvement occasionally can be demonstrated more quickly with promizole than with similar sulphones such as promin and diasone. The authors feel that the therapeutic results so far obtained with promizole are sufficiently encouraging to warrant further clinical study.

D.

Highlights of the Conference in Tropical Dermatology for American Doctors held at Mexico City from 6th to 18th August, 1945

By H. HARRIS PERLMAN, M.D.

and

MARQUIS R. HUFFMAN, M.D.

(Abstracted from the *Urologic and Cutaneous Review*, April 1946, p. 219)

THE 8th, 9th and 10th sessions of this Conference held on the 13th, 14th and 15th August, 1945, were devoted to deliberations on leprosy. These consisted of discussions and demonstrations. The discussions included general information on aetiology, treatment, control, geographical distribution, etc., of the disease; the classification of leprosy came in for special consideration. The defects of the classification adopted at the Cairo International Congress, 1938, were pointed out and it was stated that the best classification so far available was the classification by the Brazilian workers which divided cases of leprosy into three types: lepromatous, tuberculoid and non-characteristic. These three types were described and illustrated by cases. The demonstrations included demonstration of ocular complications of leprosy. In the conjunctiva the leprosy changes are most marked at the corneal conjunctival margin, i.e. the limbus. Keratitis is a frequent occurrence in the lepromatous type, and three types have been described: (1) Punctate keratitis, clearly observable by the corneal microscopes. (2) parenchymatous keratitis, which is the commonest type and which exists as a diffused infiltration of the entire parenchyma, and (3) true lepromatous resulting in the destruction of cornea. The iris and ciliary body are affected by a serious type of irido-cyclitis; an exudate forms which gives rise to synechia between the pupil and the lens.

D.

Fatal Anaphylactic Shock

By JACOB WERNE

and

IRENE GARROW

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 29th June, 1946, p. 730)

ON 19th June, 1945, the death of identical twins after a second injection of diphtheria toxoid and

pertussis antigen, alum precipitated, was reported for investigation.

History.—D. M. and G. M., boys, aged 10 months, were brought to St. John's Long Island City Hospital (service of Dr. James M. Dobbins) on 19th June, 1945, at 7-15 a.m. D. M. was pronounced dead on arrival; the condition of G. M. was described as critical. He was cyanotic and dyspnoeic; respirations were shallow, rapid and laboured. Oxygen was given by mask, suction was applied for aspiration of mucus; 4 c.c. of nikethamide were given at 8 a.m., 3 minims (0.18 c.c.) of epinephrine at 8-15 and 2 c.c. of caffeine with sodium benzoate at 8-45. At this time the temperature was 99°F. Cyanosis continued to be present at intervals. One c.c. of picrotoxin was given at 9-30; respirations were then noted as being 38. At 10 and 10-30 3 more minims of epinephrine were given, and at 10-45 infusion of plasma was begun. Before 40 c.c. were given the subject was pronounced dead.

The family physician stated that nothing untoward was noticed immediately after the injections except that 1 twin bled slightly from the site, necessitating the application of an additional cotton pledget. The parents stated that following the first injection one month before (from another ampoule of the same product) D. M. vomited, had a temperature of 101°F. and cried considerably. One-half grain (0.032 gm.) of acetylsalicylic acid was given and by evening he was apparently well. G. M. remained symptom-free after the first injection.

After the second immunizing injections, both infants cried considerably on reaching home; they vomited and consumed excessive amounts of water, each taking about two full bottles. They then 'fell asleep' and when next noticed by their parents appeared 'lifeless'. Their position in the cribs remained unchanged, and they could be aroused only by loud noises. D. M. had a 'staring' expression; his temperature was 90°F. At 11-30 p.m., when his diaper was changed, he was found to be 'icy cold' and wringing wet with 'perspiration'. The parents explained that they regarded these symptoms as expected effects of the injections and therefore did not summon medical aid until 5-30 a.m., when D. M. appeared to be dead and G. M. gravely ill.

The twins were born at eight months' gestation, D. M. weighing 2 pounds 8 ounces (1,134 gm.) and G. M. 5 pounds 4 ounces (2,381 gm.). The former was placed in an incubator and developed normally. Both continued in good health. At 6 months they were vaccinated against smallpox.

The mother had been inoculated against diphtheria as a child but did not receive any injections during pregnancy. There was no history of allergy on her side of the family. The father described a sudden swelling of the lower lip while in the army, which disappeared as precipitously as it came on. After receiving his medical discharge he experienced another similar episode, which was diagnosed as 'allergic' by a medical officer who happened to be present at the time.

Post-mortem study.—At autopsy both twins were well nourished and well developed. The sites of recent inoculation in the deltoid region were marked by minute puncture wounds of the skin and a small amount of hæmorrhage in the underlying fat. There was no gross evidence of significant inflammatory reaction. The brain in each case felt softer than usual. The subarachnoid space contained excess fluid. The meninges, mastoids, middle ears and tonsils showed no evidence of infection. There was no regurgitation or aspiration of stomach contents. The thymus of D. M. weighed 28.4 gm. and showed numerous petechiæ; that of G. M. weighed 34.1 gm. The adrenals of D. M. weighed 3.0 gm. and those of G. M. 3.2 gm.; they showed no gross abnormalities. The heart contained both clotted and fluid blood in each instance. There were epicardial and pleural petechiæ. The lungs were salmon pink and air containing for the most part. In G. M. the parenchyma on section showed oedema; in D. M. there were conspicuous focal hæmorrhages in the dependent portions. The mucosa of the larynx, trachea and bronchi was pale and free of exudate. The

broncho-pulmonary lymph nodes were not enlarged. The liver of D. M. weighed 350 gm., that of G. M. 370 gm. In D. M. it showed extreme congestion. The spleen and kidneys were moderately congested. The gastro-intestinal tract showed no gross lesions. The lymphatic follicles were normally conspicuous, as were the mesenteric nodes. The pancreas, biliary passages and genital organs were natural. There were no skeletal abnormalities. Post-mortem lung cultures were made and found sterile in each instance, and in addition a sterile post-mortem culture was obtained from the spleen of D. M.

Post-mortem serum was tested on four members of the laboratory staff for the presence of reagin after the prior intracutaneous injection of the biologic product with negative results.

The contents of the vial used in immunizing the twins, and of the vials bearing the same lot number submitted by the manufacturer, were examined by Dr. Jules Freund of the Bureau of Laboratories, Department of Health, City of New York, and the following results were obtained: 'The vaccine was found to be sterile; that is, the sterility test required by the National Institute of Health for biological products was satisfactory. The microscopic picture showed formed elements of the size and shape and staining qualities of Bordet-Gengou bacilli. Tests carried out on the skin of rabbits showed that there was no free diphtheria toxin in the vaccine. The identity test showed that the vaccine contained diphtheria toxoid, that is, combined with the diphtheria antitoxin, 0.5 c.c. amounts of the vaccine injected into the peritoneal cavities of white mice did not cause obvious toxic reactions. (The latter test is routinely done on biologicals for harmlessness.)'

The histopathologic study disclosed lesions consistent with death in anaphylactic shock. The skin at the site of inoculation (studied in G. M.) showed swelling and acute degeneration of collagen, arteriolar degenerative changes, thrombosis and hæmorrhage. Bacterial stains showed numerous forms resembling *Heinophilus pertussis*. The follicles of the spleen, lymph nodes and gastro-intestinal tract showed conspicuous macrophages containing abundant nuclear particles and cytoplasmic debris. There were numerous eosinophils in the lymphatic tissues. The thymus showed foci of hæmorrhage and necrosis, and extremely constricted arteries whose walls showed œdema, eosinophilia and endothelial swelling and proliferation.

The brain showed capillovenous engorgement, perivascular hæmorrhages, arteriolar narrowing and diffuse degenerative changes of some arterial walls, with cellular infiltration of the vessels and the surrounding space; this was mainly mononuclear, with occasional polymorphonuclears and eosinophils. Many nerve cells showed acute degenerative changes.

Heart sections showed focal necrosis of muscle, more accentuated beneath the epicardium and endocardium. Constricted lumens, œdema and necrosis of some arterial walls were observed, as were swelling and some proliferation of the endothelium. Perivascular hæmorrhages were frequent in relation to such areas. Sections of aortic and mitral cusps showed endothelial swelling and increased mononuclear cells throughout the leaflets.

The respiratory epithelium showed excellent preservation with intact cilia. (Fulminating respiratory infection, the most common cause of unexpected death during infancy, was thereby excluded.) Extreme narrowing of some bronchial and many arterial and arteriolar lumens was conspicuous. Mononuclear, slight polynuclear and slight eosinophilic infiltration occurred in both bronchial and pulmonary arterial walls. The pulmonary veins and alveolar septal capillaries were deeply engorged. The lymphatics were dilated with abundant protein precipitate. There were foci of pulmonary œdema, both interstitial and intra-alveolar, and foci of hæmorrhage and early intra-alveolar exudate, mainly polymorphonuclear, especially in the case of D. M. Fibrinous exudate and bacteria were not seen.

The liver sections showed extensive parenchymatous degeneration, most evident in the central two-thirds of the lobule: this took the form of granular and hydropic change, with pyknosis of nuclei and chromatolysis. The sinusoids contained abundant leukocytes, with a moderate number of eosinophils. Occasional focal necrosis was seen, mononuclears filling the parenchymatous defect; some multinucleated hepatic cells occurred in peripheral portions of some lobules.

The widespread visceral lesions encountered seem adequate to explain the profound shock observed clinically. The histological appearances point to acute vascular injury as the underlying cause. This results from the basic physiological disturbances that seem adequate to explain the apparently diverse manifestations of the anaphylactic state: contraction of smooth muscle and increased capillary permeability. The former, if severe enough in bronchiolar or pulmonary arteriolar muscle, is believed to cause death by asphyxia or dilatation of the right ventricle, as in the guinea-pig and the rabbit respectively.

In view of the high mortality that accompanies both diphtheria and pertussis during infancy, it is hoped that the publication of a report of these two fatalities will not deter the profession from continuing to practise immunization. It will be recalled that the family history was positive for allergy; the father suffered from what appeared to be episodes of angioneurotic œdema. It would seem that the influences of heredity and twinning deserve weight as determinants of individual predisposition in the cases reported here. A search of the literature disclosed no other fatalities following inoculation with pertussis antigen and diphtheria toxoid, whether separately or combined.

Delayed Serum Sickness Reaction to Penicillin

By EVERETT J. GORDON

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 29th June, 1946, p. 727)

THREE cases of delayed reaction to penicillin are reported. The first case was originally reported in April 1945, in the *Medical Bulletin of the Mediterranean Theatre of Operations* (restricted), but because of the limited distribution and availability of this publication it is again presented here in abstract form.

Case 1.—A white soldier, aged 23, was admitted to the evacuation hospital on 1st February, 1945, with pneumonia of the left hilar area. His treatment included a course of penicillin of 25,000 units administered intramuscularly every three hours for five days, a total of 1 million units. On the third day of treatment his temperature fell to normal, and his symptoms cleared rapidly with a fairly smooth convalescence.

Five days after the cessation of penicillin therapy he complained of the sudden onset of itching 'hives' on his arms and legs, soon spreading to his trunk. Investigation revealed no unusual contact such as clothes or soap and no deviation from the ward diet. The family and personal history was negative for allergy. All medication had been suspended two days before the onset of symptoms.

The following morning the urticaria had spread to involve the face, the entire trunk and all four extremities, despite treatment with ephedrine sulfate, intravenous injections of calcium gluconate and epinephrine in tablet (hypodermic) form. On the second day of the reaction the patient complained of swelling and persistent, aching pain in the phalangeal and metacarpophalangeal joints of both hands and in the joints of both ankles. Examination revealed a pitting type of œdema, local warmth, tenderness and painful motion of the affected joints; the pulse rate and temperature were slightly elevated.

Treatment hypodermically with epinephrine hydrochloride 1:1,000 solution was followed by a sharp decrease in the generalized pruritus and mild blanching of the erythematous areas, but the relief was only

transitory. In administering this drug it was noted at the time that there was little relief or disturbance from the use of the tablet form of epinephrine which apparently had deteriorated, whereas injection of the epinephrine hydrochloride solution not only relieved the symptoms of the reaction but also caused appreciable preordial distress and increased nervousness, including hand tremors. Substitution of epinephrine hydrochloride in peanut oil gave much more satisfactory and prolonged relief.

Urticaria persisted for three days, but the swelling and soreness of the hands and ankles did not disappear until the seventh day of the reaction: on this day an exfoliative type of dermatitis appeared on the palms of both hands, lasting three additional days.

Case 2.—A white soldier, aged 23, was admitted to this hospital as an overseas evacuee from the European theatre for further treatment of a compound fracture of the right elbow sustained when the bomber in which he was flying was struck on 2nd April, 1945, by fragmentation bombs accidentally released by an American plane overhead. After initial treatment overseas in which he received 2 million units of penicillin he was evacuated to the United States for further care. A resection of the right elbow joint was performed on 23rd October, 1945, under gas-ether-oxygen anaesthesia, following which penicillin was administered, a routine measure after surgery on previously compound fractures. He received 25,000 units every three hours intramuscularly for nine days, during which time his temperature and pulse remained within normal limits.

Two days after the cessation of this course of penicillin, while at home on week-end pass, he noted a small patch of hives, first on the left arm but soon followed by extension to the other arm and to the trunk, face and back. Within a few hours he noted pains in the joints in both hands and both feet. The following day there was fleeting pain in both knees, not severe; the pain in the left hand had subsided somewhat. He returned to the hospital, at which time examination revealed generalized urticaria and decided swelling of the fingers of the right hand, including the metacarpophalangeal joints; there was also swelling of the toes and metatarsophalangeal joints of both feet, more pronounced on the right.

Symptoms persisted for three days in an intense form despite the use of epinephrine hydrochloride; during this time there was pronounced oedema with almost complete closure of both eyes. The oedema of the right foot persisted for several days after other symptoms had subsided; a similar condition persisted in the right hand, but the recent surgical intervention in the right elbow clouded the mechanism of its production. Five days after the onset of the reaction all swelling of the toes and fingers had entirely cleared and the urticaria had not reappeared; however, an exfoliative dermatitis of both palms had appeared on the third day, and this was still present along with a mild, generalized pruritus. No signs or symptoms were present by the eighth day of the reaction.

On questioning, the patient gave no history of asthma, hay fever or other allergies, either in himself or in his family. The only other course of penicillin he had received was that given immediately after his injury.

Case 3.—A girl, aged 20, a member of the Women's Army Corps, was readmitted to the hospital in the dermatologic service with severe generalized urticaria which involved all the extremities and the trunk but not the face and was of obscure aetiology. She stated that she had been discharged from the hospital seven days before, after having been hospitalized ten days for acute follicular tonsillitis. During her previous hospitalization she had received a course of penicillin therapy of 25,000 units every three hours, administered intramuscularly, for a total of 1,600,000 units.

While at home seven days after the last injection of penicillin she first noted a severe urticaria of her trunk, rapidly followed by extension to all four extremities. It increased in severity despite the use of ephedrine sulfate. The following day she noted aching pain in

both knees and ankles, accompanied by mild swelling. She returned to the hospital, where a careful search for possible allergic sensitivities was made, including multiple scratch and intradermal tests. The history of recent penicillin therapy was disregarded.

The urticaria cleared three days after its onset, but the pains in the joints persisted in a mild form for an additional week. Seven days after the onset an exfoliative dermatitis of the palms of both hands appeared, and this persisted one week. Ten days after the onset the reaction had subsided except for the slight persistence of mild pain in the joints in both knees and mild exfoliation of both palms.

The patient gave no history of previous allergy, either personal or within the family. She had never received any penicillin before.

In these 3 cases there have been certain similarities in the manifestation of the reaction attributed to penicillin. In each case the appearance of the reaction was delayed several days, varying from two to seven, following cessation of penicillin therapy. The first appearance in each was an intense urticaria with severe pruritus and wheal formation, appearing on one portion of the body, either the trunk or the extremities, but rapidly extending to involve most of the remaining cutaneous area. In 2 of the 3 cases there was oedema of both eyelids, causing almost complete closure. Secondly, pain in the joints accompanied by swelling, tenderness, local warmth and painful function were manifested in each case. Malaise with mild fever and tachycardia were also present at this time. A third feature which was present in all 3 cases in the later stages of the reaction was an exfoliative dermatitis of both palms: whether or not this was coincidental or an integral part of the reaction could not be determined, but it was present and was the last manifestation to disappear in each case.

The urticaria responded to treatment with epinephrine hydrochloride administered hypodermically, but it recurred repeatedly and ran a course of approximately seventy-two hours.

None of the 3 patients had had any previous manifestations of allergy in any form, nor were there any other agents to which the urticaria could be attributed.

The characteristic features of this type of reaction appear to be (1) delayed appearance following the cessation of penicillin therapy, (2) intense, severe urticaria, rapidly extending to become generalized, (3) multiple involvement of the joints, large and small, with serous effusion and intense arthralgia, (4) severe malaise, mild fever and mild to moderate tachycardia, (5) exfoliative dermatitis of both palms in the terminal stages as the urticaria fades, and (6) a self-limited course of seven to ten days irrespective of the therapy employed.

Such a composite picture strongly resembles that of serum sickness of the type usually associated with delayed reactions to biologic products such as liver extract, insulin and posterior pituitary injection.

Toxicity of Streptomycin

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 29th June, 1946, p. 745)

NINE patients ranging in age from 15 to 61 years served as subjects. A total dosage of streptomycin of 1.8 million units was administered in divided doses over a period of forty-eight hours or a dosage as high as 72 million units over a period of fifty-six days. Six of the nine patients received the antibiotic by intermittent intramuscular injections at intervals of three to four hours. Two patients were given the drug by continuous intravenous infusion and one by continuous hypodermoclysis. Renal and hepatic function tests were performed just prior to administering the first dose and within ninety-six hours of the final dose. Two additional patients, both desperately ill of tuberculous meningitis, received 3 to 7 million units of streptomycin before death. Post-mortem microscopic examination

did not reveal any liver or kidney lesions that could be attributed to the action of streptomycin. Impairment of hepatic or renal function was not detected by the series of bromosulfate, cephalin cholesterol flocculation and urea clearance studies. Neither was a significant decrease of the haemoglobin or erythrocyte levels encountered in any case.

Although evidence of serious organic toxicity was not obtained, undesirable reactions were recorded with certain patients. These reactions were of two main varieties. The first (2 patients) was characterized by facial flushing, headache and fall in blood pressure, a clinical picture resembling the classic response to histamine. The second reaction (4 patients) consisted of fever, accompanied at times with myalgias and arthralgias. Skin eruptions appeared in 2 patients. Three patients showed slight local reactions consisting of pain and tenderness at the site of intramuscular or subcutaneous injection. The local reaction was alleviated by the local application of heat. Most of the undesirable reactions were apparently related to the amount of impurities retained in the preparations, fewer symptoms being recorded with the latter, more refined preparations of the antibiotic.

The purified streptomycin is thus of such low toxicity as to be freely usable in human clinical medicine.

Vitamin E and Heart Disease

(From the *Journal of the American Medical Association*, Vol. 131, 29th June, 1946, p. 746)

ANNOUNCEMENT in newspapers and particularly in *Time* that large doses of vitamin E will bring relief from all common forms of heart disease once again prompts discussion of the manner in which the results of medical research should be brought to the attention of the public. Far too often of late there has been overemphasis in the popular press on research too fresh from the laboratory and too inadequate as to evidence to permit evaluation. The reported discovery of new and almost miraculous powers of vitamin E needs careful evaluation and confirmation because the substance had already been investigated by many competent clinicians and found wanting. Nothing in the known pharmacologic actions of vitamin E would lead one to suspect either a vasodilating action, a myotonic effect or an ability to repair damaged heart muscle in human beings.

Prediction of Heavy Death Toll from Traffic

(From the *Journal of the American Medical Association*, Vol. 131, No. 9, 29th June, p. 754)

FRANKLIN M. KREML, director of the Northwestern University Traffic Institute, informed the International Association of Police Chiefs board meeting here that in the next ten years the United States will suffer half a million deaths, 15 million injuries and 1½ million crippling injuries through automobile accidents unless a determined programme of traffic control is adopted and followed by the public.

The Indian Journal of Medical Research, Vol. 34, No. 1, May 1946, pp. 1-205

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The authors' summaries of the above articles are reproduced below :—

THE PREPARATION OF AN ANTIGEN FROM THE KEDROWSKY'S BACILLUS FOR THE COMPLEMENT-FIXATION TEST FOR KALA-AZAR

A description is given of the technique used for obtaining the antigen from the Kedrowsky's bacillus. This method is applicable for the preparation of similar antigens from other acid-fast bacilli. In the case of the tubercle bacillus, the culture should first be autoclaved to kill the bacilli.

VITAMIN A AND CAROTENE CONTENT OF GHEE (CLARIFIED BUTTER) AND 'FORTIFIED' MARGARINE

1. The total vitamin A activity of ghee prepared from the milk of well-fed cross-bred cows was found to be on the average 36.5 I.U. per g.; carotene contributed approximately 31 per cent of this value.

2. Ghee prepared from milk of buffaloes fed under known conditions had an average vitamin A content of 8.8 I.U. per gramme. In general the addition of green feeds to various concentrates leads to an increase in the vitamin A content of ghee obtained from the milk of the animals concerned. The relation between the period of lactation and vitamin A content of ghee is not marked.

3. Ghee, certified to be genuine, collected from 14 centres in the Madras Presidency contained on an average 8.5 I.U. of vitamin A per g.

4. Twelve samples of blended ghee from the Ghee Heating Centre, Agra, had an average vitamin A potency of 12.2 I.U. of vitamin A per g.

5. A good proportion of the vitamin A activity of ghee, and all the vitamin A activity of 'fortified' margarine, are lost when these are used for frying purposes.

THE DIGESTIBILITY OF CERTAIN VEGETABLE OILS AND FATS DETERMINED BY METABOLIC EXPERIMENTS ON HUMAN BEINGS

The digestibility of certain vegetable oils used for edible purposes in different parts of India, viz, mustard, coconut, sesame and ground-nut oils, of a sample of hydrogenated ground-nut oil (Dalta Varnaspati) and also of cow and buffalo butter-fats (ghee) has been determined by metabolic experiments on four human experimental subjects. It was concluded that the natural fats and oils are almost completely utilized by the human body (94 to 99 per cent) while hydrogenation appears to lower the digestibility to some extent.

THE RATE OF ABSORPTION OF DIFFERENT FATS AND OILS

The rates of absorption of mustard, coconut, olive, ground-nut and sesame oils and of butter-fat have been compared using rats (225 g. to 250 g. weight) as test animals. The fats were fed by the stomach-tube and at the end of definite intervals (2, 4 or 6 hours) the rats were killed, the intact gastrointestinal tract was removed and the fats remaining unabsorbed were determined.

Two hours after administration olive oil and butter-fat were found to be the most rapidly absorbed fats. After 4 hours mustard oil is absorbed to the greatest extent and the others show almost equal rates of absorption. After 6 hours the fats are all almost equally absorbed, the absorption of coconut oil being slightly less than that of the others.

With an increase in the amount of coconut oil administered the rate of absorption of the oil was found to be slightly increased.

THE EFFECT OF DIFFERENT FATS ON CALCIUM UTILIZATION IN HUMAN BEINGS

The influence of the dietary fat on the calcium and phosphorus metabolism in four human subjects has been investigated. Inclusion of mustard, sesame or ground-nut oil or of butter-fat in the diet greatly favoured the absorption of calcium and phosphorus and the utilization of minerals was better than in the absence of added fat. With coconut oil, however, the elimination of calcium through the faeces was greatly increased, the faecal calcium being in three cases greater than the amount of dietary calcium. The urinary excretion of calcium on coconut oil diet was also generally higher than with other fats. The use of coconut oil as the main dietary fat cannot be recommended in view of these findings.

COMPARATIVE VALUE OF BUTTER-FATS AND VEGETABLE OILS FOR GROWTH

Butter-fat fed at 3, 6 and 9 per cent levels to young rats induced maximum growth at the 6 per cent level;

the growth was poor at the 3 per cent level. The difference in growth at the 6 and 9 per cent levels is not significant.

With mustard, coconut, sesame or ground-nut oil or with cow or buffalo butter-fats fed to young rats, all at 6 per cent level, maximum growth—an increase in weight of about 12 g. per week and 2.25 g. per week per g. of fat intake—was obtained with cow butter-fat. The growth with buffalo butter-fat was slightly less. The vegetable oils gave less growth. Of the vegetable oils ground-nut oil gave the greatest (1.79 g. per week per g. of fat intake) and the sesame oil (1.32 g. per week per g. of fat intake) the least growth. Mustard and coconut oils gave a growth intermediate between ground-nut and sesame oils and the difference between mustard and coconut oils was not significant.

DESTRUCTION OF VITAMIN B₁ OF SOME VEGETABLES DURING COOKING AND THE EFFECT OF COOKING ON FREE AND COMBINED VITAMIN B₁ OF SOME FOODSTUFFS

The thiamin retention of thirty-five vegetables after cooking has been determined by the thiochrome method.

A portion of the thiamin content of all the vegetables investigated is destroyed by cooking. The average retention of thiamin after cooking of the vegetables is about 60 per cent.

The percentage destruction of free B₁ and of total B₁ in the case of some foodstuffs has also been studied. It is found that only a portion (50 to 100 per cent) of the free B₁ is destroyed by heat, while the 'bound B₁' or the co-carboxylase portion of the foodstuffs remains practically unaffected.

THE EFFECTS ON GROWTH IN RATS OF BUTTER AND RAGI (*Eleusine coracana*), SEPARATELY AND COMBINED, AS SUPPLEMENTS TO THE POOR RICE DIET OF SOUTH INDIA

1. Butter and ragi (*Eleusine coracana*) were given as supplements in increasing amounts separately as well as simultaneously to young rats on a basal poor rice diet.

2. Butter had a marked inhibiting effect on growth directly proportional to the amount given.

3. Ragi substituted for part of the rice had a marked stimulating effect on growth directly proportional to the amount given.

4. Butter and ragi when given simultaneously exerted their effects independently of each other, i.e. ragi did not counteract the negative effect of butter.

THE ABSORPTION OF FATS FROM THE HUMAN INTESTINE

1. The rates of absorption of butter, ghee, ground-nut oil, partially hydrogenated ground-nut oil, coconut oil and sesame oil from the intestines of healthy human subjects were determined by Frazer's 'chylomicron' technique.

2. Butter, ghee and coconut oil were found to be rapidly absorbed, whereas ground-nut oil and sesame oil were absorbed slowly.

3. Partially hydrogenated ground-nut oil with an iodine value of 50 was absorbed at approximately the same rate as the refined ground-nut oil of iodine value 98.

4. Ghee attained the temperature of 240°C. to 250°C. during frying of *purees*. When such *purees* containing 1 oz. of ghee were eaten, the latter was absorbed at a rate only slightly slower than unheated ghee.

5. It is suggested that the rate of absorption of fat from the intestines is determined among other things by the presence of fatty acids of low molecular weight constituting the fat. Quite a considerable alteration in the iodine value of fat by hydrogenation exerted little influence on its rate of absorption.

OBSERVATIONS ON THE CAROTENOID PIGMENTS OF LOCAL VARIETIES OF YELLOW MAIZE

The composition of 15 different varieties of yellow corn grown in different parts of the Punjab with respect to their different carotenoid pigments has been determined by the method of chromatographic separation and colorimetric estimation. Six different

pigments were detected in the samples examined which were identified as zeaxanthin, cryptoxanthin, β -carotene, α -carotene, λ -carotene, and an isomer of cryptoxanthin called neo-cryptoxanthin.

Varieties of maize varying in colour from moderate-yellow to dark-yellow and deep-red showed the values ranging from 18.76 $\mu\text{g./g.}$ to 40.78 $\mu\text{g./g.}$ for the total pigments.

From the amount of different pigments present the vitamin A potency of yellow corn has been assessed at 6.5 I.U./g. to 9.0 I.U./g. for medium yellow varieties, and 10 I.U./g. to 12.5 I.U./g. for the dark-yellow to the deep-red varieties.

OBSERVATIONS ON THE CAROTENOID PIGMENTS OF THE MANGO FRUIT

The carotenoid content of ten different varieties of mangoes available in Delhi market has been determined by the method of chromatographic separation and colorimetric estimation. Five different pigments have been detected in almost all the varieties examined. Three pigments have been identified, namely, xanthophyll, β -carotene and pseudo- α -carotene. The two other pigments have not been identified. These two pigments also appear to be of hydrocarbon nature.

The various varieties examined showed a total carotenoid content ranging from 30 $\mu\text{g.}$ to 60 $\mu\text{g.}$ per g. of which the active pigments contribute 5 $\mu\text{g.}$ to 40 $\mu\text{g.}$ per g. of the total pigments.

The vitamin A potency has been assessed at 8 to 16 I.U. per g. for poor varieties and 32 to 67 I.U. per g. for rich varieties.

OBSERVATIONS ON THE VITAMIN A CONTENT OF BUFFALO BUTTER-FAT (GHEE)

1. Forty-eight samples of buffalo ghee have been studied for their vitamin A content by the spectrographic method. Out of these, 41 samples were of genuine ghee prepared in the laboratory or in the homes from buffalo milk, while 7 samples were from the market and presumably pure. Twenty samples were found to contain below 24 I.U. of vitamin A per g.; 16 samples showed values between 24 and 30 I.U. and 12 samples above 30 I.U. per g. The average of all the samples taken together was found to be 25.4 I.U. per g.

2. Tests in the laboratory indicated that the process of clarification of butter into ghee ordinarily used in Indian homes is not likely to cause any loss of vitamin A. Prolonged heating at a relatively low temperature causes greater destruction of vitamin A than heating to high temperatures for short intervals.

3. Storing of samples of ghee under ordinary conditions at room temperatures in the summer in Lahore did not result in any significant loss of vitamin A activity during the course of a month. At the end of four months loss varying from 2.5 to 22.5 per cent was noticed in the different samples and after five to six months the loss was between 25 and 30 per cent.

4. The effect of different Indian methods of cooking upon the vitamin A content of ghee was also investigated. In the frying of *purees* 63 to 69.5 per cent of vitamin A was lost. In the making of vegetables and dhal curries, which involve the frying of vegetables and spices in ghee for 22 to 45 minutes, there appeared to be a total loss of vitamin A, while in ordinary cooking in the presence of water the loss was only about 20 to 24 per cent. In *parathas* the loss was only 8.7 per cent and in *halwa* as much as 32 to 39 per cent.

THE EFFECT OF HESPERIDIN AND A FACTOR IN BENGAL GRAM (*Cicer arietinum*) ON THE GROWTH OF GUINEA-PIGS

1. Hesperidin or vitamin P appears to be essential for the proper growth of guinea-pigs.

2. A factor isolated from Bengal gram (*Cicer arietinum*) was found to have a similar growth-promoting effect and may be identical with hesperidin.

STUDIES ON THE DESTRUCTION OF VITAMIN A IN SHARK-LIVER OIL

The influence of moisture, free fatty acids and ground-nut oil on the development of rancidity and destruction of vitamin A in shark-liver oil have been studied using an accelerated oxidation method. Water was practically inert and the increase in free fatty acids during oxidative rancidity was greater in the presence of moisture than in the dry oil. Free fatty acids acted as mild catalysts in the oxidation of the glycerides and the vitamin. The induction period of shark-liver oil, as determined by the formation of peroxides, was increased when the oil was mixed with freshly refined ground-nut oil.

FLUORINE AND DENTAL CARIES IN INDIA

1. The correlation between the incidence in children of dental caries, mottled enamel and fluorine content of drinking water has been studied in various parts of India.

2. A positive degree of correlation between the incidence of mottled enamel and the fluorine content of drinking water was observed which was found to be statistically significant.

3. Statistical analysis showed that degree of severity of mottled enamel was correlated with a higher concentration of fluorine.

4. A lower incidence of dental decay was recorded in 1,765 children showing mottled enamel as compared to 4,312 children showing no mottling of enamel.

5. The severity of mottled enamel had no influence on the caries incidence.

6. In a group of 1,074 healthy adults, who were not living throughout their life in an endemic fluorosis area, no association between the incidence of dental caries and mottled enamel was elicited.

ERUPTION AGE OF TEETH IN INDIA

An attempt has been made to estimate the eruption age of teeth in certain Indian populations. From the data collected in North and South India estimates have been provided for the eruption age of each tooth.

The differences noticed in the eruption ages between boys and girls are not very marked; those between boys of South and North India are also small. Our estimates seem to indicate that in India the eruption of teeth takes place somewhat earlier than in the United States of America.

ANÆMIA AND MALNUTRITION IN INDIAN ARMY RECRUITS

1. An attempt has been made to correlate the blood findings and nutritional status of 801 South Indian army recruits.

2. Anæmia was much commoner in the third of the men whose muscle development was poor than in the two-thirds whose muscle development was moderate.

3. Anæmia was least common in men with poor subcutaneous fat, and most common in men with good subcutaneous fat.

4. There was a clear correlation between anæmia and cutaneous and ocular vitamin deficiency signs.

5. In the more malnourished third of the men an increasing hookworm load progressively added to the amount of anæmia, but no such correlation could be demonstrated in the better-nourished men.

6. Anæmia and splenomegaly were correlated.

7. Most of the anæmia was normocytic and normochromic, but there was usually evidence suggestive of iron deficiency. Macrocytic anæmias were rare and mild.

A FEEDING EXPERIMENT AMONG INDIAN ARMY RECRUITS

1. An experimental dietary survey and feeding experiment was carried out at two Indian army recruit training centres during 1944, over a period of 16 to 20 weeks. The methods used are described.

2. A nutritious diet (the standard Indian army ration), fed to men of the Indian peasant classes, mainly aged about 20 years, caused a gain in weight

amounting to about 5 to 10 per cent of their initial weight within 3 to 4 months. There was also a marked clinical improvement which, however, was not accurately reflected in a record of the incidence of certain specific signs attributed to chronic malnutrition.

3. The addition of 16 fluid ounces of milk to the basic diet did not cause any increase in the gain of weight, but is believed to have accelerated clinical improvement. The latter was manifested particularly in an improvement of skin texture.

A PRELIMINARY STUDY OF THE BIOCHEMICAL CHANGES IN STARVATION CASES

1. Prolonged starvation lowers the blood-sugar level. In some cases figures as low as 0.040 per cent were observed.

2. In certain groups of starvation cases marked lowering of carbohydrate tolerance was observed while in other groups absorption of glucose from the alimentary tract was found to be well below normal.

3. The total serum-protein content of the blood in starvation cases was found to be universally low. This affected the albumin fraction only. In cases with marked oedema the fall in the albumin (as also in the total protein) was sometimes of an extreme degree.

4. The globulin content of the blood was not decreased but was normal or increased. This was particularly obvious in cases with concurrent infection as in the oedema cases.

5. The albumin : globulin ratio was markedly altered. Sometimes, in extreme cases, a reversal of the normal ratio was obtained.

6. Non-protein nitrogen and uric acid were high in the majority of cases. The phospho-lipoid content was found to be exceptionally high in some cases. The cholesterol and the calcium content was found to be low in the majority of the cases.

7. Chloride and urea excretion in the urine was low in almost all cases.

STUDIES ON THE BIOCHEMISTRY OF THE 'CHOLERA-RED' REACTION. PART I

1. The inhibitory effect of glucose on the positive 'cholera-red' reaction in a broth culture has been shown to be due to its reducing influence. Other reducing agents are capable of playing the same rôle.

2. The theory of glucose-tryptophan complex as explaining the failure to obtain a positive 'cholera-red' reaction appears untenable on the basis of experimental observation.

3. The addition of minute amounts of oxidizing agents, capable of undergoing reversible change, can catalytically overcome the influence of reducing agents.

STUDIES ON THE BIOCHEMISTRY OF THE 'CHOLERA-RED' REACTION. PART II

1. Liberation of specific enzyme for breakdown of tryptophan takes place in the presence of glucose. But the formation of the specific end product, which gives positive 'cholera-red' reaction, is prevented in a reducing environment.

2. The enzyme is separable from the cells to a very small extent. It belongs to the class of adaptive enzymes and is heat labile being destroyed on being heated at 56°C. for 30 minutes.

3. A modified technique for the 'cholera-red' reaction has been suggested.

STUDIES ON CARBOHYDRATE METABOLISM

1. The glucose and ascorbic acid contents of blood and inorganic phosphate, potassium, bilirubin and diastase contents of serum were determined in 53 normal persons (31 males and 22 females) and 94 diabetic patients (84 males and 10 females).

2. The relationship between fasting serum inorganic phosphate and fasting blood glucose is definitely altered in diabetes.

3. There is significant inverse relationship between the relative variations in the glucose content of blood

and inorganic phosphate content of serum during the first two hours after the administration of glucose in the case of diabetic subjects. However, diabetics cannot be considered different from normals in this respect.

4. There is no evidence to show that the relationships between the other blood constituents examined are altered in diabetes.

STATISTICAL STUDIES IN GLUCOSE TOLERANCE

1. Statistical analysis of glucose values of fasting blood from 20 normal male subjects between the ages of 18 and 32 shows (i) that the glucose level of fasting blood is affected by variations in body-surface area, but not by those in age and (ii) that there is a high degree of correlation between the glucose levels of blood taken before and after administration of glucose.

2. A multiple regression formula of blood glucose on body-surface area and age is given with a table of estimated glucose values.

PHARMACOLOGICAL ACTION OF AN ACTIVE CONSTITUENT ISOLATED FROM *Dæmia extensa* LINN. (SYN. *Pergularia extensa*). PART I

1. An active constituent of glucosidic nature has been isolated from *Dæmia extensa* in a fairly pure condition, and appears to be toxic to white mice, frogs, guinea-pigs and cats.

2. It has a stimulant action on the involuntary muscles, plain or striated, and a pronounced effect on the circulatory system, raising the arterial blood pressure appreciably.

3. Its action on the uterus appears comparable with that of pituitrin, for which it may prove to be a possible substitute.

4. Its effects appear to be due to (1) the direct stimulation of involuntary muscles, and possibly (2) the stimulation of post-ganglionic cholinergic nerves in the structures concerned.

SECTION OF THE HYPOTHALAMUS TO REMOVE THE HYPERGLYCAEMIC EFFECT OF URETHANE

The most anterior plane through which section is to be made to abolish the hyperglycaemic effect of the hypothalamus passes through the anterior border of the superior corpora quadrigemina above and mamillary bodies below.

THE COMPARATIVE ACTION OF SOME ALKYL HYDROCUPREIDINES

The intensity of action was increased from hydroquinidine and ethyl hydrocupreidine as derivatives higher and higher in the series were tested. The sec-octyl hydrocupreidine behaved a little differently. All these derivatives in adequate doses had a depressing action on the plain muscle of the intestine and the cardiac musculature. The fall of blood pressure was partly due to the depression of the myocardium and partly to the dilatation of vessels of the organs. There was a rise of pulmonary pressure, due to the constriction of pulmonary vessels. Pulmonary oedema was observed with higher members of this series.

STUDIES ON COAGULATION OF BLOOD

1. Certain substances in common use have been found to possess marked anti-coagulant properties.

2. The mode of action of these substances and of some of the well-known anti-coagulants has been studied and classified.

3. A suggestion is put forward that coagulation of blood may be an immunological reaction, with fibrinogen as antibody, prothrombin as complement and any foreign body in association with thromboplastin as antigen.

Activity of a New Antimalarial Agent Pentaquine (SN 13,276)

By R. F. LOEB

(Abstracted from the *Journal of the American Medical Association*, Vol. 132, 12th October, 1946, p. 321)

PENTAQUINE (SN 13,276) is 6-methoxy-8-(5-isopropylaminoamylamino)-quinoline.

In all the laboratory and clinical tests, pentaquine has been used in the form of its diphosphate (75.5 per cent base). The salt forms yellow needles which melt at 188–190°C. (402–406°F.) and is moderately soluble in water and slightly soluble in alcohol.

The close resemblance of this drug to pamaquine was observed in experimental animals and in man. It is rapidly absorbed from the gastro-intestinal tract. Plasma levels are quickly attained and decline to zero within twenty-four hours after the drug is stopped. The levels can be fairly well sustained by administering the drug on a four-hour schedule throughout the day and night. There is poor correlation between the dosage and the concentrations of drug in the plasma. Variations in the plasma levels of different persons on a given dosage are often great; but in groups of patients there is a tendency for the plasma level to rise as the dosage is increased. The concentration of the drug in the plasma is usually slightly lower than that which results from the administration of an equivalent dose of pamaquine. Concurrent administration of quinine with pentaquine tends to increase the plasma concentration of the drug to a slight extent.

Conclusions on the toxicity of pentaquine in human beings are based on the results of its administration to 171 white volunteers in dosages from 15 to 180 mg. base per day during the prophylactic and curative tests. At the therapeutic dose, the toxicity of pentaquine is qualitatively the same and quantitatively approximately one half to three-fourths that of pamaquine in adult persons.

Thus 60 mg. of the base administered concurrently with 2 gm. of quinine a day in divided doses for fourteen days is equal in toxicity to 30 to 45 mg. of pamaquine base administered similarly with quinine. At this dosage, the toxic symptoms are occasional anorexia, abdominal discomfort or pain and slight methemoglobinemia (average for 44 patients 4.5 per cent). In limited therapeutic studies of the drug at higher dosages (120 mg. base per day) the toxicity has been considerably greater than that observed with 60 mg. of pamaquine, possibly equal to the toxicity of 90 mg. pamaquine base. In general, the symptoms at higher dosages are qualitatively similar to those which result from the administration of pamaquine; but one symptom which occurred in 2 of 20 subjects, acute syncope due to postural hypotension, and persisted for several months has not been observed after the maximum tolerated dose of pamaquine (90 mg. base a day). It is possible that drug fever may be encountered in a certain number of instances.

Clinical experience with pentaquine has been almost completely restricted to heavy infection with the Chesson strain of *P. vivax* under experimental conditions. The Chesson strain, like other Southwest Pacific strains, is characterized by a high relapse rate. Three types of experiments have been performed:

1. *Prophylactic tests.*—In prophylactic tests, the drug has been administered for eight days to non-immune patients, who are bitten by ten heavily infected mosquitoes on the second day of drug administration. Pentaquine is at least partially effective in preventing the establishment of malaria when administered in toxic dosage (120 to 180 mg. base a day).

2. *Curative tests.*—The primary attacks, the first and the second relapses of non-immune patients inoculated by the bites of ten infected mosquitoes, have been treated for fourteen days. Drugs have been administered every four hours throughout the day and night. Under these conditions, pentaquine will terminate individual attacks but is only partially effective in

preventing relapses when it is administered alone, in dosages as high as 120 mg. base per day; however, when combined with 2 gm. of quinine, the administration of 60 mg. of base a day has led to complete eradication of the disease in 16 of 17 subjects treated. No relapses have occurred in 35 patients treated during their third relapses.

3. *Field type experimental infections.*—In tests of field type experimental infections, volunteers were bitten by ten infected mosquitoes on each of three alternate days, making available extremely heavy experimental infections. In this situation it has been found that the effectiveness of pentaquine is less striking. Sizable percentages of such experimental subjects relapse after the concurrent administration of 60 mg. of pentaquine and quinine for as long as three weeks.

RECOMMENDED DOSAGE

A. *In suppression and prophylaxis.*—The toxicity of pentaquine is too great to warrant its use in prophylaxis or prolonged suppression of malaria.

B. *In cure of malaria due to Plasmodium vivax.*—A daily dose of 60 mg. base (equivalent to 80 mg. of diphosphate) and 2 gm. of quinine administered concurrently in divided doses every four hours for fourteen days is sufficient to produce radical cure of severe infections due to *P. vivax*. The daily dose of 60 mg. base should not be exceeded. Longer therapy may be necessary when non-immune persons have been unusually heavily seeded and have not had previous suppressive therapy. Pentaquine (SN 13,276) should be administered only under close medical supervision, preferably during hospitalization.

Streptomycin in the Treatment of Subacute Bacterial Endocarditis

By W. S. PRIEST

and

C. J. MCGEE

(Abstracted from the *Journal of the American Medical Association*, Vol. 132, 21st September, 1946, p. 124)

OCCASIONALLY a case of subacute bacterial endocarditis may be encountered in which the organism is a gram-negative rod insensitive to penicillin. Although a cure may be obtained by the combined use of penicillin and sulphonamides as was true in the boy of S whose recovery is recounted, streptomycin should be the drug of first choice when dealing with such organisms.

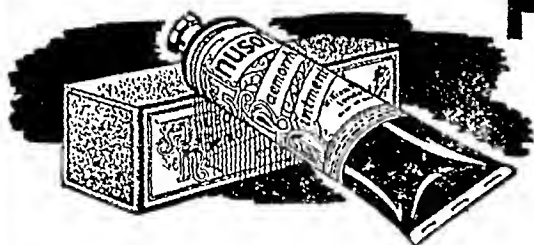
Strains of streptococci which are highly insensitive to penicillin may be encountered more frequently. These may be relatively sensitive to streptomycin. Three such organisms were encountered in cultures from a group of 34 patients. One was typically *Streptococcus viridans* after freezing, but was rather atypical in primary cultures of blood. The other two were typical non-hemolytic streptococci. *In vitro* sensitivity to penicillin ranged from 0.8 to 6 units per cubic centimetre. Sensitivity to streptomycin ranged from 0.1 to 1 unit per cubic centimetre. Streptomycin apparently produced sterilization of the valvular lesions in case 1, resulted in negative cultures of blood after penicillin therapy had failed in case 2 and was solely responsible for the cure obtained in case 3.

The dose of streptomycin used, 500,000 units (0.5 gm.) per day, is not necessarily that which will be adequate in all cases in which the use of the drug is indicated. In the 3 cases here reported, serum streptomycin levels of 3 to 12 units per cubic centimetre were obtained.

Unsuccessful Vaccination

(From the *British Medical Journal*, ii, 14th September, 1946, p. 406)

AN unsuccessful vaccination is not proof of insusceptibility to smallpox. A case has been reported recently of a soldier who had been vaccinated no fewer than



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ten times, always unsuccessfully, during the twelve months before he died of hæmorrhagic smallpox.

True inherited absolute immunity against smallpox, which is but temporary, occurs only among infants born of variolous mothers or of women who have themselves lately undergone successful vaccination. It is not uncommon for primary vaccination to fail to take in a susceptible infant. If a successful result has not been obtained after three attempts at intervals of ten to fourteen days, and if the degree of risk of exposure to smallpox infection warrants some delay, further series of attempts should be made at about three-monthly intervals. In the event of prolonged apparent insusceptibility to vaccinia a change of technique, the use of multiple insertions, and the choice of a different site for the inoculations should be considered; but the operator should not be satisfied until success has crowned his efforts. It goes without saying that the quality of the lymph should be above suspicion.

The Apparently Acute Abdomen in Pulmonary Tuberculosis

By F. E. DE W. CAYLEY

(From the *British Medical Journal*, ii, 14th September, 1946, p. 403)

TWICE in the last three months I have been called to see patients who have been known to have pulmonary tuberculosis and who have complained of abdominal pain of sudden onset and great severity. On examination they both had board-like rigidity of the abdomen with diffuse agonizing pain, and obviously thought their last hour had come. In one case the duty medical officer happened to be of surgical bent and had already called in an anæsthetist to ascertain the patient's fitness for operation, having made a diagnosis of perforated tuberculous ulcer of the bowel. Now in both cases some common features presented themselves. It had been a hot day. Both patients were drenched in sweat as they both had advanced phthisis with high fever, and there is little doubt in my mind that their pain was of a similar ætiology to miners' cramp. I have seen similar abdominal pain in the sweating stage following a malarial rigor, and before I became familiar with the condition, these cases caused me a good deal of worry.

The treatment is table salt given in orangeade, about 2 dram to a pint (8 g. to 568 ml.).

Reviews

STERNAL PUNCTURE: A METHOD OF CLINICAL AND CYTOLOGICAL INVESTIGATION.—By A. Piney, M.D., M.R.C.P., and J. L. Hamilton-Paterson, M.D., M.R.C.S. Third Edition. 1946. William Heinemann Medical Books Limited, London. Pp. xv plus 80, with 12 coloured plates. Price, 15s.

THE idea behind the book is very good which is shown by the popularity it has attained, the copy under review being the third edition. Full justice, however, has not been done to the subject.

The confusion that exists in the minds of the general medical men about erythropoiesis and the nomenclatures used with regard to the different cells has been still more confused. The normal myelogram of the authors differs in no small way from normal myelo-

grams reported by other workers, while myelograms shown under Kala-Azar and Malaria differ markedly from the myelograms seen in these conditions in the Indian subjects. The coloured plates are generally good but the identifying nomenclatures used with regard to some of the cells are questionable.

C. R. D. G.

PRE-OPERATIVE AND POST-OPERATIVE TREATMENT.—Edited by Lieut.-Colonel Robert L. Mason, M.C., A.U.S., and Harold A. Zintel, M.D. Second Edition. 1946. W. B. Saunders Company, Philadelphia and London. Pp. xiv plus 584. Illustrated. Price, 35s.

A new edition is most welcome. When the book appeared in 1937 it was well in advance of anything then in print.

There is again a great deal of recent work assimilated into the body of the various chapters.

Among the names of contributors are many new ones, some of which have been prominent in the journals during the last 8 years. We miss the name of Homans and his beautiful article on thrombosis. Linton's article is excellent and in no way inferior, it is just the absence of an old favourite.

The book is too long to review in detail. Suffice it to say that we have read it with great care and can find no statement which could be said to be unreasonable or impracticable. There is much the experienced surgeon can learn from this book. To the junior surgeon it should provide a constant sound helpmate.

A. T. A.

MANUAL OF DIAGNOSIS AND MANAGEMENT OF PERIPHERAL NERVE INJURIES.—By Robert A. Groff, M.D., and Sara Jane Houtz, B.S. With an Introduction by I. S. Ravdin, M.D. 1945. J. B. Lippincott Co., Philadelphia and London. Pp. xii plus 188, with 111 illustrations. Price, 36s.

THOSE of us who knew the splendid Unit working on the Assam-Burma frontier under the able and stimulating leadership of Brigadier-General Ravdin will remember Lieut.-Colonel Groff and Lieut. Houtz.

This book deserves the highest praise as a complete neat manual on the subject, written on the spot under terrible conditions of climate and hard work. The arrangement of the material is convenient to the needs of the working surgeon and supplies him quickly with all the details required. The diagrams are clear and self-explanatory.

The summary of anatomy at section 14 could have been enlarged with great advantage by the addition of small cross-sections of the limbs. These give the flat diagrams the necessary three dimensional data required so often in difficult dissections for injured nerves.

We recommend the book to all general surgeons as well as those intending to take up nerve surgery.

A. T. A.

CLINICAL HANDBOOK: FOR RESIDENTS, NURSES AND STUDENTS.—By V. M. Coppleston, M.B., Ch.M., F.R.C.S., F.R.A.C.S. Third Edition. 1946. Angus and Robertson Ltd., Sydney. Pp. x plus 459, with 14 figures. Price, 25s.

A CLEAR concise account of Ward work very suitable for students and nurses. As a text for nurses it is excellent. For residents it could have been fuller and more discursive. The text is accurate in so far as it goes.

The fact that the book is now in its third edition speaks volumes for the popularity of a readable simple text amongst nurses and dressers.

A. T. A.

BOOKS RECEIVED

1. Jubilee Volume dedicated to Emil Christoph Barell, Philosophiæ Doctor, Medicinæ Doctor Honoris Causa, Rerum Politicarum Doctor Honoris Causa, President of F. Hoffmann-La Roche and Company, Limited Company on the occasion of the Fiftieth Anniversary of his Association with the house of Roche by the Scientific Workers of the Roche Companies, Basle. Pp. 468. Illustrated.

2. All-India Dental Association (Regtd.). Affiliated to the British Dental Association. List of Members 1946-47. Head Office: 13, Curzon Road, New Delhi. Printed at the Caxton Press, Connaught Circus, New Delhi. Pp. 53. Price, Rs. 5.

Abstracts from Reports

REPORT OF THE RANCHI EUROPEAN MENTAL HOSPITAL FOR THE PERIOD 1ST APRIL, 1945, TO 31ST MARCH, 1946. BY CAPTAIN C. W. E. PETERS, I.M.D. (RETD.), OFFICIATING MEDICAL SUPERINTENDENT. PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRINTING, BIHAR, PATNA

THE number of patients resident in the hospital at the commencement of the year under review was 274 (133 males and 141 females) as compared with 234 (99 males and 135 females) during the year 1944-45. The total number admitted during the year 1945-46 was 313 (287 males and 26 females) as compared with 227 (195 males and 32 females) in the previous year. The admissions included 252 service patients.

The daily average population of patients was 269.13 against 258.50 in the previous year.

Nearly 40 per cent of the patients had neurosis and psychoneurosis. Next, in order of frequency, were schizophrenia, paranoid states, manic depressive insanity, mental deficiency, epileptic insanity, secondary dementia, etc.

The treatment of mental disorders consisted in giving electrically induced convulsion, shock therapy by drugs, pyrexia therapy, hydrotherapy, prolonged narcosis, malaria therapy, occupational therapy and other physical, medicinal or endocrine therapy.

The convulsive treatment definitely cuts short the acute symptoms in early cases, lessens the danger of self-infliction and exhaustion, the nursing difficulties and period of hospitalization. Replacing shock therapy by cardiazol and insulin, it does not induce fear or hostility in the patient. It is more economical and time-saving. No accidents occurred.

R. N. C.

ANNUAL REPORT ON THE WORKING OF THE CIVIL HOSPITALS AND DISPENSARIES IN THE MADRAS PRESIDENCY FOR THE YEAR 1945. PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS, MADRAS. Pp. 54. PRICE, RS. 2

Medical relief.—The number of medical institutions in the province at the end of 1945 was 1,182 against 1,194 in the previous year. The number of in-patients treated increased from 410,751 to 424,255. The percentage of deaths to the total number of in-patients treated was 4.53 as against 5.08 during the previous year. Operations increased from 588,063 to 601,783.

The diseases which accounted for the largest number of patients treated in the medical institutions were malaria, scabies, diseases of the ear, ulcerative inflammation, and diseases of the respiratory system other

than pneumonia and tuberculosis. There was an increase in the number of patients treated for enteric fever.

Rural medical relief.—Thirteen dispensaries were opened during the year, bringing the total to 333. Of these, 27 were closed and 9 converted into regular dispensaries, leaving 297 dispensaries at the end of the year. In view of the increase in the cost of living, the Government have sanctioned enhanced subsidy to midwives employed in rural dispensaries.

Tuberculosis.—The total number of patients treated for tuberculosis was 86,407 as against 79,619 in the previous year. The deaths were 1,397 as compared to 1,431 of the previous year. Final year students of the Madras Medical College and the Stanley Medical College, Madras, attended the Tuberculosis Hospital for clinical instruction and demonstrations on recent methods of diagnosis and treatment. Health visitors under training also were given lectures and bedside demonstrations of the methods of nursing in different types of the disease.

Leprosy.—The Madras Provincial Branch of the British Empire Leprosy Relief Association is responsible for the leprosy work in this province. In order to intensify the anti-leprosy campaign, the Government have appointed a specialist as Honorary Director of the Leprosy Research and Honorary Director of the Leprosy Campaign. The Government are financing a Segregation Scheme in the Polambakkan area in Mathuranthakam taluk, Chingleput.

Veneral.—A male social worker was appointed to meet as many of the married patients as possible and persuade them to bring their partners and children for tests and treatment. He has to visit the houses of out-patients also to trace contacts and persuade defaulting patients to continue treatment.

Blood transfusion service.—With the cessation of hostilities the Blood Transfusion Service was continued on a peace basis.

Medical services.—There has been a gradual increase in the cadre strength of the Madras Medical Service with the creation of additional appointments to cope with the increased work in medical institutions and in the special departments of the Medical Colleges and also for special work in connection with famine, epidemics, etc.

The Government have sanctioned the deputation of three officers of the Madras Medical Service for post-graduate study in the United Kingdom and the United States of America in the following subjects during the year:—

- (1) Ophthalmology.
- (2) Chemistry of foods, drugs and forensic chemistry.
- (3) Pharmaceuticals.

Nursing services.—During the year additional nursing staff was sanctioned in the categories of matrons, sister tutors, ward sisters, nurses and nurse pupils. All posts of matrons and sister tutors were raised to gazetted status and a separate category of sister tutors was formed. The compensatory allowances admissible to the several categories of the nursing staff were also enhanced. The Government have sanctioned the deputation of the sister tutor of the diploma of nursing course for the study of Nursing Education at Toronto and Canada, under the Rockefeller Foundation Fellowship. A candidate was selected and deputed to the U.K. for training as probationary nurse under the scheme inaugurated by the Government of India.

Certain philanthropic persons gave donations for the endowment of medals and prizes for nurse pupils every year to encourage them to pass creditably in the examinations.

Medical education.—The University of Madras has instituted post-graduate diploma and higher degree courses in special subjects of Medicine, Midwifery, Surgery, etc., while the Andhra University instituted M.Sc. courses in anatomy, physiology and biochemistry and post-graduate diploma courses in gynaecology and obstetrics, laryngology and otology and ophthalmology, etc.

Buildings.—Owing to the restrictions imposed on the use of steel, iron, etc., major building schemes were not carried out. However, the Government sanctioned the construction of nurses' quarters on up-to-date lines for the King George Hospital, Vizagapatam, and for the Government General Hospital, Madras. The construction of anatomy, physiology and pharmacology blocks in the Stanley Medical College, Madras, the construction of the Central Preliminary Training School for Nurses at Madras and the completion of the extension to the pathology block in the Andhra Medical College, Vizagapatam, were also sanctioned.

General.—With a view to relieve the superintendents of certain Government medical institutions in Madras City and in the mofussil of their administrative and non-technical duties, so that they might have more time for professional and technical work, the Government sanctioned the employment of lay secretaries and treasurers of gazetted rank in some important institutions. The Government are glad to note that, despite adverse circumstances arising out of the war, the working of the civil hospitals and dispensaries has continued to be satisfactory.

Correspondence

ASTHMA AND PNEUMONIA

SIR,—A patient aged 45 was suffering from asthma for the last 15 years. Practically every other day he used to suffer from asthmatic attack. During my treatment he developed pneumonia. He was cured of this by usual treatment. After this attack of pneumonia he is free from asthmatic attack. I hope somebody will try to throw some light over this observation.

Yours sincerely,
HAR NARAIN SINGH,
B.Sc., M.B., B.S.

ABOHR,
23rd February, 1947.

ANTIBIOTICS

SIR,—We have read with interest your editorial of the December 1946 issue, page 538. You have referred to the antibiotic activity of 'Allicin' from *Allium sativum* in the said article. We are sending herewith two reprints for your kind perusal as these might be of some interest to you.

Yours faithfully,
S. N. DUTTA,
Secretary, Bengal Immunity Co., Ltd.

[The two reprints referred to are abstracted below :—

(1) On the Anti-bacterial Activity of *Allium sativum*. By U. P. Basu and P. N. Sen Gupta. *The Antiseptic*, October 1946.

Garlic was washed with water and left overnight spread over a wooden tray. Three hundred such were then picked and the bulbs were macerated and immersed in 9-10 lb. of rectified spirit. The infusion was filtered and the residual mass was again immersed in 5 lb. of spirit for two consecutive days. The whole filtrate was then concentrated under reduced pressure (15-20 mm.).

The residual gummy mass was then dissolved in double distilled water and was subsequently extracted with ether previously washed with dilute alkali solution. The ethereal extract was evaporated in vacuo. The oily residue was washed with petrol ether twice and dried in vacuo over liquid paraffin. This oil was used for anti-bacterial study.

The crude extract itself exerts a bacteriostatic activity against gram-positive and gram-negative organisms.

(2) Anti-bacterial Properties in Chlorophyll. By A. B. Bose and P. N. Sen Gupta. *Journal of the Indian Med. Assoc.*, Vol. XV, No. 11, August 1946, pp. 361-362.

A known amount (80 gm.) of fresh leaves from three plants, viz, *Tagetes patula* Linn. (Beng. Gandha), *Argemone mexicana* Linn. (Beng. Shialkanta), and *Achyranthes aspera* Linn. (Beng. Apang) was washed in water and put in a litre flask containing 200 c.c. of 90 per cent alcohol. It was then kept in a boiling water bath for 2 to 3 hours. The alcoholic extract was then poured in a separating funnel containing 100 c.c. ether. 200 c.c. of distilled water was added slowly down the side of the funnel. The lower layer was run off. The addition of distilled water and subsequent removal of lower layer was repeated four times.

The green and yellow pigments were separated by the following procedure: The ether layer was treated with alcoholic caustic soda (2 gm. NaOH in 25 c.c. calcium). The total solution was then saponified for 18-20 hours. 100 c.c. water was added for complete separation of two layers. The lower green aqueous layer was collected and slowly concentrated on a steam bath to 80 c.c. The pH of the solution was adjusted to 7.6-7.8. It was then filtered through candle. The total chlorophyll (solid) content of this solution was found to be 0.1 per cent approximately.

All three samples were found to exhibit bacteriostatic effect on *Staphylococcus aureus* up to 1:40 dilution. These also inhibited the growth of *Streptococcus hemolyticus* up to 1:80 dilution.—Editor, I.M.G.]

PROGRESSIVE MUSCULAR ATROPHY

SIR,—Mild itching—soreness (with slight epiphora), next the inner canthus in the two eyes, by turn, and a crack-like ulceration at the junction of the skin and mucous membrane in the two sides of the nose alternately—recurrent attacks of these two complaints during December-January last in a case of progressive muscular atrophy was treated and cured with B₁, plinocaine and sulfanilamide mixed with honey. Was it correct to think that these troubles were of a trophic origin?

As to the P.M.A. the case may be described as follows: Vague pains in the left arm were felt during the winter of 1945. He (about 60 years) was used to a dumb-bell exercise ('mudgar'). Gradual weakness followed by some wasting in the left arm. Shoulder muscles attracted the attention in July 1946. Hollows—eminences were felt to the touch; they were not yet quite visible. Injections of strychnine and vitamin B₁ were started in August 4-5 times a week. Progressive atrophy and weakness in the left arm began to cease and decrease but the symptoms now appeared on the other side (in October). This was the time when pains in the previously affected muscles (of the left arm) grew much 'stronger' especially during the intervals between injections. Electric and quake-like shocks were felt specially in hunger and when in very cool atmosphere. These pains grew weaker with the increasing number of injections while the symptoms on the right side continued to develop, until the pains there had assumed the same 'strong' character. This too again after a few days declined and the two arms are now in a much improved and equally good condition needing an injection every 2-4 days. Strychnine has been injected in 1/50 to 1/15 gr. and B₁ in 15-25 mg. doses.

According to Quain—A trophic lesion is a departure from healthy nutrition by the cutting off from certain tissues or parts of some customary nervous influence as in the production of rapid muscular atrophy.

GONDA,
27th February, 1947.

A. OMAR.

[Further observations will be valuable in this case as the disease is rare in India.—Editor, I.M.G.]

Service Notes

APPOINTMENTS AND TRANSFERS

THE VICEROY AND GOVERNOR-GENERAL has been pleased to make the following appointments on His Excellency's personal staff :—

To be Honorary Surgeons

Colonel J. R. Koehlar. Dated 24th November, 1946, vice Colonel R. Lee, vacated.

Colonel S. M. A. Faruki. Dated 4th February, 1947, vice Colonel R. A. Logan, O.B.E., vacated.

Lieutenant-Colonel M. K. Kelavkar, O.B.E., is appointed temporarily as Drugs Controller, with effect from the 4th October, 1946.

The services of Major F. E. Buckler are placed at the disposal of the Director-General, Indian Medical Service, for employment in Viceregal Dispensary, after relinquishing of his Emergency Commission in Indian Medical Service and reversion in I.M.D. (B.C.) now Indian Army Medical Corps (SMS-CC) in his previous status w.e.f. dated 2nd April, 1946.

The undermentioned officer of the Indian Medical Service reverts from the Indian Army Medical Corps and is seconded for service with the Royal Indian Navy :—

Major (T-Lt.-Col.) R. L. Soota, M.B.E. Dated 18th October, 1946.

The Secretary of State for India has sanctioned the reversion to military employment of Major J. Edis Myers of the Madras Indian Medical Service Cadre, with effect from the 17th January, 1947.

Major A. C. Taylor, O.B.E., is appointed Surgeon to His Excellency the Viceroy, with effect from the 28th January, 1947.

Major E. J. Cullen is appointed as Medical Adviser (Pensions), (D.A.D.M.S.), Defence Department (Pensions Branch). Dated 1st February, 1947.

Major M. Ata-Ullah, O.B.E., is appointed as Assistant Director-General, Indian Medical Service (Resettlement), with effect from the 7th February, 1947.

Major V. Srinivasan recalled to duty and posted as Civil Surgeon, Nagpur, from 17th March, 1947.

The services of the undermentioned officers of the Indian Army Medical Corps are replaced at the disposal of the Director of Medical Services in India, with effect from the date shown against their names :—

Captain N. N. Roy. Dated 10th October, 1946.

Captain Harris Haridhan. Dated 13th November, 1946.

Captain S. H. Damle. Dated 14th November, 1946.

Captain H. R. Kherra. Dated 1st December, 1946.

Captain Mulla Mal. Dated 20th December, 1946.

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

To be Lieutenant

J. H. Mason. Dated 11th January, 1945.

LEAVE

The leave of Lieutenant-Colonel W. H. Crichton, Director of Public Health, C.P. and Berar, has been extended up to 31st August, 1947.

Lieutenant-Colonel F. R. W. K. Allen, Civil Surgeon, Amraoti, is granted leave for 4 months with effect from the 10th March, 1947.

Lieutenant-Colonel W. Scott, Civil Surgeon, Nagpur, is granted leave for 6 months from the 17th March, 1947.

Major S. S. Bhatnagar, an officer of the Medical Research Department, was granted combined leave for 16 months (*vis*, war concession leave on average pay for 4 months, and leave on half-average pay for 8 months), with effect from the 5th March, 1946.

PROMOTIONS

Lieutenant-Colonel to be Colonel

J. W. F. Albuquerque, O.B.E. Dated 13th November, 1946.

The undermentioned Indian Medical Service Officer is advanced to the List of Special Selected Lieutenant-Colonels :—

Lieutenant-Colonel M. G. Bhandari, C.I.E. Dated 3rd January, 1947.

Majors to be Lieutenant-Colonels

W. F. Cooper. Dated 2nd November, 1946.

A. N. Duggal. Dated 19th November, 1946.

A. K. M. Khan. Dated 15th January, 1947.

2nd February, 1947

S. S. Bhatnagar. B. Chaudhuri, O.B.E.

H. L. Batra.

A. V. O'Brien. Dated 15th February, 1947.

18th February, 1947

L. Dass. S. M. K. Mallick.

T. C. Puri.

19th February, 1947

C. Mani. R. R. Bakshi.

Captains to be Majors

G. F. J. Thomas. Dated 13th October, 1946.

J. H. Cater. Dated 31st October, 1946.

R. D. Ewing. Dated 1st November, 1946.

O. Walker. Dated 11th November, 1946.

1st January, 1947

G. B. Jackson, C.B.E. C. W. Greene.

W. N. Pennell, O.B.E. T. A. Cunningham.

D. R. Hanbury.

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captains to be Majors

M. N. Menon. Dated 4th May, 1946.

D. K. Bose. Dated 10th May, 1946.

A. D. Iliff. Dated 12th June, 1946.

P. C. Koshy. Dated 25th July, 1946.

H. L. Anand. Dated 18th November, 1946.

A. Sen Gupta. Dated 4th December, 1946.

15th December, 1946

A. P. Diwan. V. V. Ainaपुर.

K. Vullakki. N. Sen Gupta.

Lieutenants to be Captains

J. H. Mason. Dated 11th January, 1940.

G. L. Bawa. Dated 8th October, 1945.

RELINQUISHMENTS

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Lieutenant-Colonel. His services are replaced at the disposal of the Government of Madras, with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Lieutenant-Colonel Dharma Raj Subramania Iyer. Dated 27th March, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Lieutenant-Colonel. His services are replaced at the disposal of the Government of U.P. from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Lieutenant-Colonel M. P. Goel. Dated 2nd May, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are replaced at the disposal of the Government of Punjab from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Major Vidya Sagar. Dated 26th October, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are replaced at the disposal of the Government of N.-W.F.P. from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Major Aminul Haq. Dated 16th January, 1947.

The undermentioned officer is permitted to relinquish her commission on release from army service and is granted the honorary rank of Major. Her services are replaced at the disposal of the Government of Bihar from the date specified :—

INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

(WOMEN'S BRANCH)

Ty. Major (Mrs.) T. K. Sundaram. Dated 13th August, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Major S. R. Sarma. Dated 24th May, 1946.

Ty. Major A. E. Sundereson. Dated 19th August, 1946.

Major Sachindra Nath Sen. Dated 31st August, 1946.

Major G. H. S. David. Dated 2nd November, 1946.

Ty. Major C. B. D'Silva. Dated 30th November, 1946.

Ty. Major S. D. Malaviya. Dated 11th December, 1946.

Major K. Parthasarathy. Dated 18th December, 1946.

Captain Manakampat Madhavan Unni Nayar. Dated 23rd December, 1946.

Captain Kartar Singh Kalra. Dated 23rd December, 1946.

(WOMEN'S BRANCH)

Major Phanindra Krishna Gupta. Dated 24th May, 1946.

Captain (Mrs.) Isabel Hutton. Dated 5th September, 1946.

Ty. Major Amulya Kumar Saha. Dated 25th September, 1946.

Major T. S. Chohan. Dated 26th September, 1946.

Ty. Major T. D. Gowri Sankar. Dated 30th October, 1946.

Major Trilochan Singh. Dated 11th November, 1946.

Chimanlal Maneklal Kikan. Dated 16th November, 1946.

Ty. Major Babu Ram Mahajan. Dated 14th December, 1946.

Major Mahendra Nath Sen. Dated 20th December, 1946.

Major R. M. Nadkarni. Dated 28th December, 1946.

Ty. Major Thekkethalackal Uthup Poonnen. Dated 30th December, 1946.

Captain Jagjit Singh. Dated 6th January, 1947.

Ty. Major Jayantilal Vithaldas Karia. Dated 11th January, 1947.

The undermentioned officer is permitted to relinquish his commission on grounds of ill health and is granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Major P. V. Krishnan. Dated 27th November, 1946.

Captain J. N. Das. Assistant to Medical Adviser (Pensions), Defence Department (Pensions Branch), relinquished his appointment, dated 4th February, 1947.

The undermentioned officer is permitted to relinquish his commission on grounds of ill health :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain K. N. L. N. Iyengar. Dated 27th August, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of Madras with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain Ramavaram Sreenivasam Kesavaraj. Dated 26th March, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are placed at the disposal of I.G.C.H., Assam, Shillong, from the date specified below :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Major M. K. Ray. Dated 29th April, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of the N.-W.F.P. with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain S. M. Qureshi. Dated 18th August, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain Nagarapy Samuel Reddy. Dated 11th November, 1945.

Captain S. K. Misra. Dated 29th April, 1946.

Captain V. S. D. D. 11th May, 1946.

Captain Money. Dated 19th May, 1946.

Captain Mrs. Hannah, E. Kaibre (nee H. Cohen). Dated 20th July, 1946.

Captain T. Karunakaran. Dated 22nd August, 1946.

Captain P. Chandra. Dated 28th August, 1946.

Captain (Miss) Leela Ramchandran (nee M. H. J. James). Dated 31st August, 1946.

Captain R. N. Banerjee. Dated 4th September, 1946.

Captain Jayanty Suryanarayana Rao. Dated 23rd September, 1946.

Captain A. M. Francis. Dated 29th September, 1946.

Captain S. Parthasarathy. Dated 14th October, 1946.

Captain Som Nath Sharma. Dated 16th October, 1946.

Captain Krishna Pillay Mahadevan Pillay. Dated 24th October, 1946.

Captain Abdul Karim. Dated 27th October, 1946.

Captain J. E. Abraham. Dated 29th October, 1946.

Captain P. Krishnamurthy. Dated 29th October, 1946.
 Captain C. M. A. Raza. Dated 2nd November, 1946.
 Captain Tanjore Prasannasimh Row. Dated 3rd November, 1946.
 Captain S. Y. Torne. Dated 17th November, 1946.
 Captain Bimal Chandra Chatterjee. Dated 23rd November, 1946.
 Captain Brijballabh Parshad. Dated 25th November, 1946.
 Captain Nootheti Chinna Venkata Raman. Dated 26th November, 1946.
 Captain J. Ramakrishnayya. Dated 28th November, 1946.
 Captain Sudhansu Bhushan Palit. Dated 4th December, 1946.
 Captain M. Ishaq. Dated 5th December, 1946.
 Captain Daljit Singh Goel. Dated 9th December, 1946.
 Captain Shiv Dev Surie. Dated 10th December, 1946.
 Captain Mani Ram Thapliyal. Dated 13th December, 1946.
 Captain Narayanasami Pillai Sundararajan. Dated 14th December, 1946.
 Captain Homi Bomanji Parehlwala. Dated 16th December, 1946.
 Captain Shridhar Sadashiv Katdare. Dated 19th December, 1946.
 Captain M. Illahi. Dated 20th December, 1946.
 Captain P. C. Reddy. Dated 21st December, 1946.
 Captain J. N. Dhar. Dated 27th December, 1946.
 Captain P. O. Ittooppunny. Dated 29th December, 1946.
 Captain Champaklal Trambaklal Shah. Dated 31st December, 1946.
 Captain M. F. D'Silva. Dated 8th January, 1947.
 Captain A. C. Narula. Dated 16th January, 1947.
 Captain G. T. Joshua. Dated 23rd January, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain B. Marisiddappa. Dated 1st July, 1946.
 Captain S. K. R. Chaudhuri. Dated 12th August, 1946.
 Captain N. C. Datta. Dated 26th September, 1946.
 Captain P. K. Mukerjee. Dated 10th October, 1946.
 Captain Abdul Ghani. Dated 13th October, 1946.
 Captain A. J. Arungari. Dated 16th October, 1946.
 Captain G. M. Mallesu. Dated 7th November, 1946.
 Captain T. S. Kurup. Dated 10th November, 1946.
 Captain Surendra Gururao Sidenur. Dated 15th November, 1946.
 Captain Amulya Kumar Ray. Dated 19th November, 1946.
 Captain S. N. Dass. Dated 22nd November, 1946.
 Ty. Major V. S. Gopalakrishnan. Dated 22nd November, 1946.
 Captain Syed Abdul Wadud. Dated 25th November, 1946.
 Captain Syed Kazim Husain Uraizy. Dated 2nd December, 1946.
 Captain H. R. Hacob. Dated 3rd December, 1946.
 Captain Tincouri Dey. Dated 3rd December, 1946.
 Captain Fredoon Firoshow Gazdar. Dated 10th December, 1946.
 Captain Raghunath Krishna Garde. Dated 15th December, 1946.
 Captain S. N. Sahibzada. Dated 22nd December, 1946.
 Captain M. S. N. Khan. Dated 24th December, 1946.
 Captain Saurendra Nath Sinha. Dated 27th December, 1946.
 Captain Tadimalla Rama Seshagiri Row. Dated 28th December, 1946.
 Captain Thelapurath Madhavan Nair. Dated 31st December, 1946.

Captain S. C. Sarkhel. Dated 2nd January, 1947.
 Captain Samuel Bunyan. Dated 8th January, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS
 (Emergency Commissions)

Captain P. S. Raghavan. Dated 27th October, 1946.
 Captain P. Ramamurti. Dated 27th October, 1946.
 Captain K. S. Gill. Dated 28th October, 1946.
 Captain B. K. Banerjee. Dated 25th November, 1946.
 Captain S. C. Bose. Dated 6th December, 1946.
 Captain K. S. Ramakrishnan. Dated 6th December, 1946.
 Captain S. Rao. Dated 9th December, 1946.
 Ty. Major P. Das. Dated 13th December, 1946.
 Captain C. M. Desai. Dated 15th December, 1946.
 Captain S. S. Kapur. Dated 15th December, 1946.
 Captain P. C. Badhwar. Dated 17th December, 1946.
 Captain I. B. Sen Gupta. Dated 19th December, 1946.
 Captain K. G. K. Rao. Dated 20th December, 1946.

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Original Articles

CLINICAL TRIALS OF PALUDRINE*

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IN this communication are reported the therapeutic effects of the new synthetic antimalarial drug, paludrine, in certain doses which are specified below. The patients for this investigation were admitted to the Carmichael Hospital for Tropical Diseases. Only those patients whose blood showed malarial parasites in fair or large numbers were selected while those in whom the clinical attack had been of more than a week or in whom any antimalarial drug had been given before admission to hospital were excluded. Four-hourly temperature charts were kept and thick blood films stained by Field's technique were examined twice daily until the blood became negative for asexual parasites and thereafter only once daily throughout the period during which the patients were observed in the hospital unless there was a recurrence of fever or reappearance of parasites when the blood was examined twice daily again.

Of the 80 patients treated 47 had *Plasmodium falciparum*, 30 had *P. vivax*, 2 had *P. malariae* and one had mixed infection (*P. falciparum* and

Dosage

The drug was administered by mouth in tablet form, 100 mg. each. It was temporarily withheld if the patient was having a paroxysm with vomiting, otherwise no special time relationship to the malaria cycle was observed. Suggested schedules of treatment recommended by the manufacturers are numerous and varied. To start with, we chose arbitrarily the dosage of one tablet three times a day for four days, with which 27 patients were treated. Thereafter, we tried single dose therapy and treated 11 with one tablet and 42 with three tablets only in one dose. The object of choosing these single doses was to find out to what extent they can control the clinical attacks of malaria as there is a vast scope for such therapy in the rural areas of India where the mass of the people cannot afford to undergo radical treatment. Thus in this series the following three different courses of treatment were used :—

Regime A—a single dose of paludrine, 100 mg.

Regime B—a single dose of paludrine, 300 mg.

Regime C—one tablet, 100 mg., thrice daily for 4 days (total dose—1,200 mg.).

The scheme of dosage in different age groups was as follows :—

Age in years	Above 12	6 to 12	Under 6
Regime A	100 mg. (1 tablet).	50 mg. (½ tablet).	50 mg. (½ tablet).
Regime B	300 mg. (3 tablets).	150 mg. (1½ tablets).	100 mg. (1 tablet).
Regime C	(1 tablet t.d.s. for 4 days).	(½ tablet t.d.s. for 4 days).	(½ tablet b.d. for 4 days).

TABLE I
Race, sex and age of patients

Infection	RACE			SEX		AGE IN YEARS		
	Bengali	Other Indians	Non-Indians	Males	Females	Up to 12	13-20	Above 20
<i>P. falciparum</i> ..	31	15	0	40	6	5	8	33
<i>P. vivax</i> ..	16	10	5	27	4	0	8	23
Mixed (F. and V.) ..	0	1	0	1	0	0	0	1
<i>P. malariae</i> ..	2	0	0	2	0	2	0	0
TOTAL ..	49	26	5	70	10	7	16	57

vivax). The distribution of patients according to race, sex and age is shown in table I.

*This work was aided by a grant from the Indian Research Fund Association.

Results of treatment

All the 80 patients, whatever the dosage and the nature of their infection, became free from fever and asexual parasites fairly quickly. The

TABLE II

Effects of paludrine on temperature, parasites and relapses

Regime	Number	Infection	Duration of fever in days	Asexual parasites seen in days	GAMETOCYTES FIRST SEEN			Gameto-cytes seen in days	Observation period in hospital in days	Relapse after days
					Before treatment	During treatment	After treatment			
A. (A single dose of 100 mg.)	1	F	2	2	+	..	..	55	55	18
	2	F	4	2	..	..	..	0	10	..
	3	V	3	3	+	..	..	6	14	..
	4	F	5	2	..	..	+	6	9	..
	5	V	1	2	+	..	..	3	8	..
	6	F	2	2	+	..	..	30	30	19
	7	F and V	3	2	+	..	..	26	26	8 (F)
	8	F	3	3	..	..	+	23	24	15
	9	F	3	5	..	..	+	27	30	4
	10	M	5	4	+	..	..	20	30	18
	11	F	2	2	..	..	+	23	24	..
B. (A single dose of 300 mg.)	1	V	3	4	+	..	..	8	19	..
	2	F	3	2	..	..	+	16	19	8
	3	F	2	2	+	..	..	12	14	..
	4	F	1	2	..	..	..	0	10	..
	5	V	4	3	+	..	..	5	30	21
	6	F	2	2	+	..	..	13	13	..
	7	F	1	2	+	..	..	4	30	21
	8	F	3	2	..	..	+	9	11	..
	9	F	4	3	..	..	+	9	10	..
	10	F	3	2	..	..	+	5	8	..
	11	V	1	1	+	..	..	3	5	..
	12	V	1	2	+	..	..	4	5	..
	13	F	3	3	..	..	+	4	12	..
	14	V	3	2	..	..	+	5	21	..
	15	F	3	2	..	..	..	0	11	..
	16	V	2	2	+	..	..	8	13	..
	17	F	4	3	..	..	+	1	7	..
	18	F	2	4	..	..	+	21	30	3, 10
	19	F	2	2	..	..	+	5	10	..
	20	F	2	2	..	..	+	10	30	20
	21	V	3	3	..	..	+	3	22	..
	22	F	2	2	..	..	+	1	6	..
	23	F	3	3	..	..	+	4	5	..
	24	V	2	3	+	..	..	3	5	..
	25	F	3	2	..	..	+	4	14	..
	26	V	1	1	+	..	..	4	9	..
	27	V	3	3	+	..	..	4	18	..
	28	V	2	2	..	..	+	8	14	..
	29	V	3	5	+	..	..	7	22	..
	30	F	2	2	..	..	..	0	45	..
	31	V	3	2	+	..	..	5	28	..
	32	V	3	2	+	..	..	12	12	..
	33	V	1	2	+	..	..	1	20	..
	34	V	1	1	..	..	+	1	4	..
	35	V	4	4	+	..	..	5	30	..
	36	F	2	2	..	..	+	1	9	..
	37	F	3	2	+	..	..	19	21	15
	38	V	4	4	..	..	..	0	5	..
	39	V	3	3	+	..	..	28	28	..
	40	F	2	2	..	..	+	15	19	..
	41	F	2	2	..	..	+	21	30	..
	42	F	2	1	..	..	+	23	30	..
C. (100 mg. t.d.s. for 4 days.)	1	F	4	2	..	..	+	4	15	..
	2	V	1	2	..	+	..	2	10	..
	3	F	4	2	..	..	+	6	13	..
	4	F	2	1	+	..	..	14	15	..
	5	V	2	3	+	..	..	5	9	..
	6	F	2	2	+	..	..	14	14	..
	7	F	2	2	..	..	..	0	5	..
	8	V	1	2	+	..	..	3	11	..

TABLE II—concl'd.

Regime	Number	Infection	Duration of fever in days	Asexual parasites seen in days	GAMETOCYTES FIRST SEEN			Gameto-cytes seen in days	Observation period in hospital in days	Relapse after days
					Before treatment	During treatment	After treatment			
C. (100 mg. t.d.s. for 4 days.)	9	F	3	2	..	..	..	0	10	..
	10	V	1	2	+	..	..	4	19	..
	11	V	2	5	+	..	..	6	9	..
	12	V	3	3	+	..	..	6	11	..
	13	V	2	1	+	..	..	1	8	..
	14	V	2	1	+	..	..	3	10	..
	15	F	3	3	..	..	..	0	7	..
	16	F	3	3	..	..	..	0	5	..
	17	V	3	3	..	+	..	1	6	..
	18	F	4	2	..	..	+	0	9	..
	19	F	3	2	..	..	..	0	8	..
	20	F	3	2	..	..	+	12	16	..
	21	V	3	2	+	..	..	3	20	..
	22	V	3	3	..	..	+	3	12	..
	23	V	3	2	..	..	..	0	4	..
	24	F	3	3	..	..	+	8	24	..
	25	F	1	2	..	..	+	2	5	..
	26	F	2	2	+	..	..	30	30	..
	27	M	3	4	+	..	..	21	21	..

F = *P. falciparum*.V = *P. vivax*.M = *P. malariae*.

immediate effects on the temperature and the parasites are shown in table II.

The average period by which the temperature became normal and the parasites disappeared from the peripheral blood was as follows:—

Regime	Duration of fever	Duration of asexual parasites in blood
A	3 days	2.6 days
B	2.4 "	2.4 "
C	2.5 "	2.3 "

The differences seem slight but they become more noticeable if we follow the results from day to day. It will be seen from table III that while treatment B and C each cleared the parasites in about 11 per cent of the cases in the first 24 hours, the action of A did not become manifest till the second day when it almost equalled the effects obtained in B and C in two days. From the third day onwards the action of the three regimes seemed to depend on the strength of their dosage, being comparatively slow with A, rather quick with C and intermediate with B. In the majority of the cases the parasites had disappeared from the blood within three days—82 per cent in A, 88 per cent in B and 93 per cent in C. The corresponding figures as regards temperature were 73, 88 and 89 per cent respectively. In no case was there any fever or asexual parasite in the blood after the fifth day.

The results are also represented in percentage of total number of cases of each group in the following graph:—

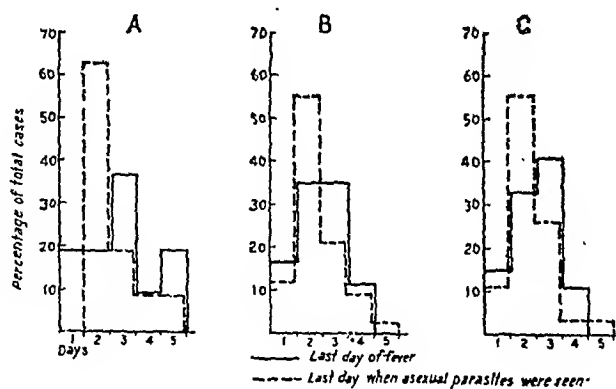


Fig. 1.

The clinical response is illustrated by the following temperature charts (figures 2, 3, 4 and 5).

Another feature that emerges (see tables III and IV) is the markedly parasiticidal action of paludrine on *P. falciparum* on the second day of treatment, whereas in the case of *P. vivax* the action was distributed more or less evenly over the first three days. Actually, by the second day, 77 per cent of the falciparum parasites had been destroyed against 53 per cent of the vivax parasites. Here, too, the extent of their disappearance was dependent on the regimen used, being 71, 77 and 79 per cent under A, B and C respectively in the case of falciparum

TABLE III
Day-to-day effect of paludrine on temperature and parasites

Regime	Infection	Total cases	Last day of fever					Last day when asexual parasites were seen in blood				
			1	2	3	4	5	1	2	3	4	5
A	F V F and V M	7	1	2	2	1	1	0	5	1	0	1
		2	1	0	1	0	0	0	1	1	0	0
		1	0	0	1	0	0	0	1	0	0	0
		1	0	0	0	0	1	0	0	0	1	0
B	F V	11	2	2	4	1	2	0	7	2	1	1
		Per cent	18.2	18.2	36.3	9.1	18.2	0	63.6	18.2	9.1	9.1
		26	2	13	9	2	0	1	19	5	1	0
		16	5	2	6	3	0	4	4	4	3	1
C	F V M	42	7	15	15	5	0	5	23	9	4	1
		Per cent	16.7	35.7	35.7	11.9	0	11.9	54.8	21.4	9.6	2.3
		14	1	4	6	3	0	1	10	3	0	0
		12	3	5	4	0	0	2	5	4	0	1
C	M	1	0	0	1	0	0	0	0	0	1	0
		27	4	9	11	3	0	3	15	7	1	1
		Per cent	15.0	33.3	40.6	11.1	0	11.1	55.5	26.0	3.7	3.7

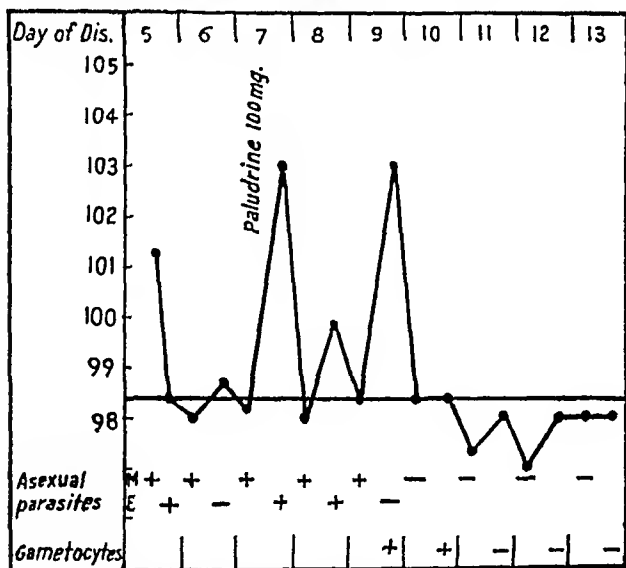


Fig. 2.—Effect of single dose of paludrine, 100 mg., on vivax malaria (regime A, case 3).

infection, whereas the percentages for vivax infection were 50 and 58 under B and C (here we have omitted the A group as having had only too few cases of this type).

Relapses

The study of the relapse rate was somewhat handicapped on account of emergency conditions in the city which prevented us from keeping the patients in the hospital as long as we

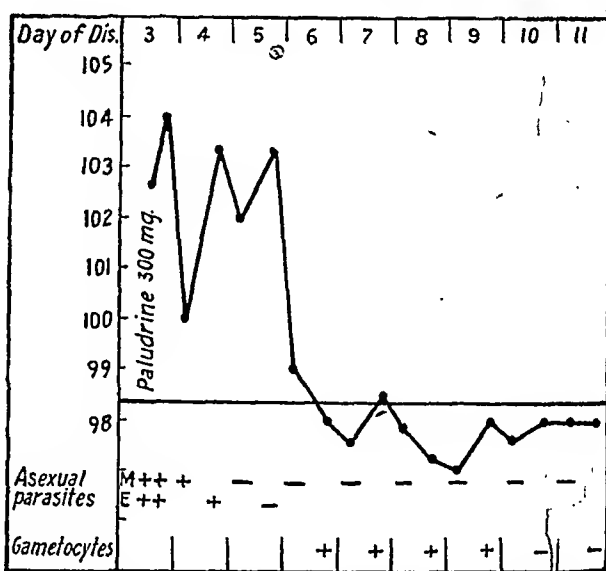


Fig. 3.—Effect of single dose of paludrine, 300 mg., on falciparum malaria (regime B, case 10).

had wished. Only 39 patients could be kept under observation from 14 to 30 days, and one patient was for 55 days (table II). Except one all the relapsed patients had fever as well as parasites in the blood.

In group A, of the 8 patients who were under observation, 6 relapsed after an average interval of 14 days (4 falciparum, 1 falciparum and vivax, and 1 malariae). One of them with falciparum infection showed

TABLE IV
Effects on *P. falciparum* and *P. vivax* cases

Infection		Last day when temperature was above normal					Last day when parasites were seen				
		1	2	3	4	5	1	2	3	4	5
47 F cases	Number	4	19	17	6	1	2	34	9	1	1
	Per cent	8.6	40.4	36.2	12.7	2.1	4.3	72.4	19.0	2.1	2.1
30 V cases	Number	9	7	11	3	0	6	10	9	3	2
	Per cent	30	23.3	36.7	10	0	20.0	33.3	30	10	6.7

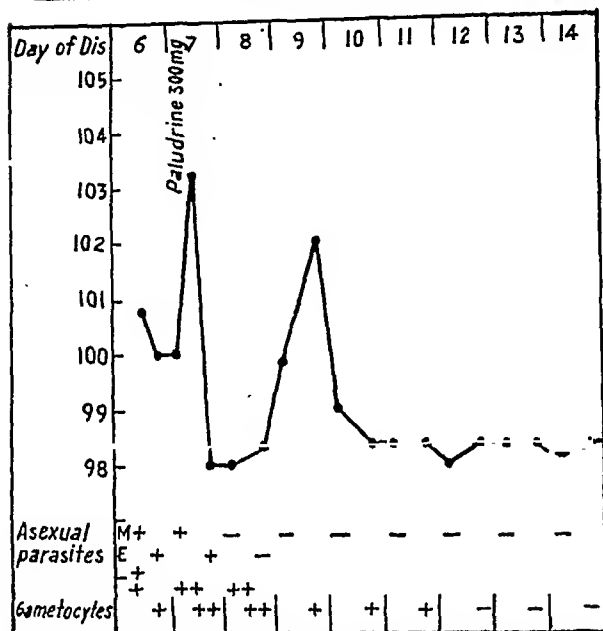


Fig. 4.—Effect of paludrine, 300 mg., on vivax malaria (regime B, case 14). Asexual parasites were seen on the 8th day of disease—not shown in figure.

parasites in the blood but developed no fever. The actual intervals between the cessation of fever and the occurrence of relapses in the six cases were 4, 8, 15, 18 and 19 days. Figure 6 shows the temperature chart of case 8 with falciparum malaria relapsing after 15 days.

A patient with *P. malariae* infection was treated with regime A (case 10). The duration of fever was 5 days and asexual parasites were seen in blood for 4 days. He had a relapse after 18 days (see figure 9) which was treated with regime C.

In group B, of the 22 patients under observation, 6 relapsed (5 falciparum and 1 vivax) after an average interval of 15 days, the actual intervals being 8, 21, 21, 3 and 10, 20 and 15 days. Figure 7 shows the temperature chart of case 2 with falciparum infection relapsing after 8 days. One of these patients (case 18) appeared resistant to this therapy.

A Mohammedan male, aged 35 years, an employee of this institution, was admitted to the hospital with fever and rigors for 3 days but without any vomiting. Blood showed *P. fal-*

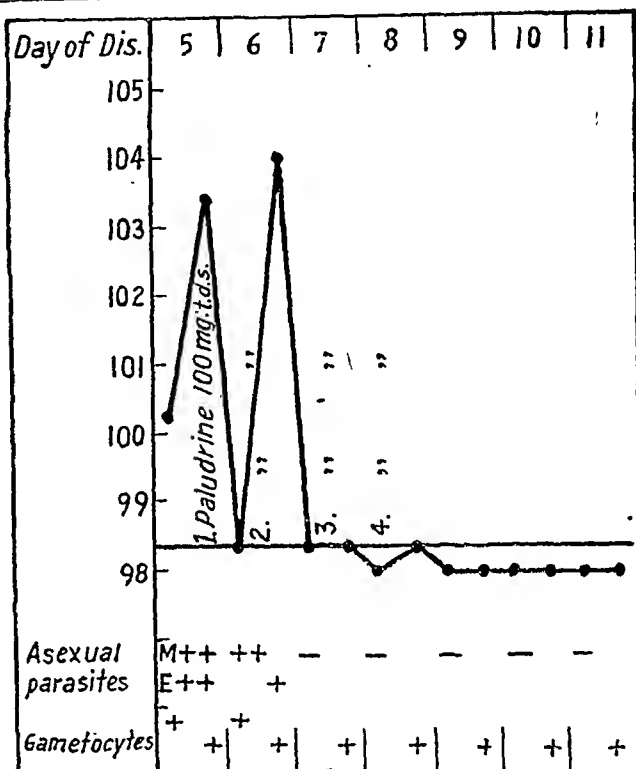


Fig. 5.—Effect of paludrine, 100 mg. t.d.s. for 4 days, on falciparum malaria (regime C, case 6).

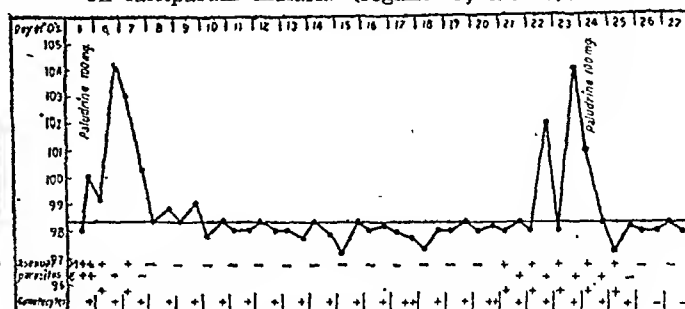


Fig. 6.—Falciparum malaria (regime A, case 8). Relapse after 15 days.

ciparum rings. After a single dose of 300 mg. of paludrine the temperature became normal on the 3rd day but the parasites, after a temporary absence for 24 hours (see figure 8), reappeared followed by recurrence of fever. The same dose of paludrine was repeated and he became fever-parasite free in 2 days. Ten days later he had another relapse which was 'successfully' treated with regime C.

In group C, none of the 9 patients (6 falciparum, 2 vivax and 1 mixed) while under hospital observation had any relapses.

To summarize, in a series of 39 patients kept under observation from a fortnight to a month or longer, 12 relapsed, viz, 6 out of 8 patients in group A (85.7 per cent) and 6 out of 21

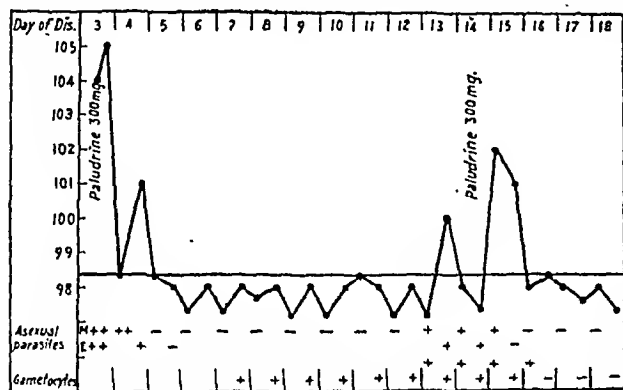


Fig. 7.—Falciparum malaria (regime B, case 2).
Relapse after 8 days.

patients in group B (29 per cent), while the 9 patients in group C remained free. They were all cases infected with *P. falciparum* excepting one of *P. vivax* and one of *P. malariae*. There

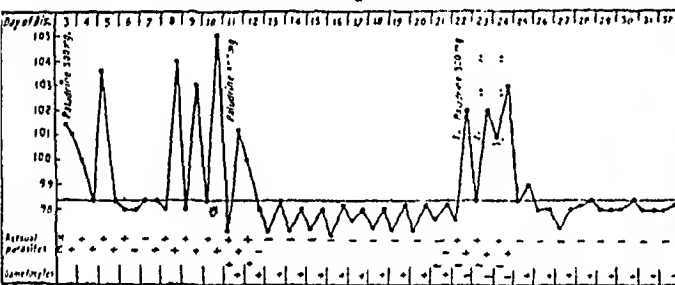


Fig. 8.—Falciparum malaria resistant to regime B (case 18).

were two noteworthy relapses or recrudescences, one after 4 days of apparent clinical cure with regimen A and another after 3 days following the regimen B.

Effect on gametocytes

Gametocytes were present in the blood of 36 patients before treatment was started and they appeared in the blood of 33 patients during and after the treatment. Paludrine had obviously no effect on them. Mosquitoes were fed on two patients with crescents in the blood 4 and 5 days after treatment. Subsequent dissection of these mosquitoes in the entomology department of the School revealed no growth of the parasites in them.

Toxic action

No untoward effect was observed in any patient which could be attributed to the drug.

But it is worth mentioning that one patient with chronic malarial splenomegaly, not included in this series, who was having 2 tablets of paludrine thrice daily; complained of severe pain in the abdomen on the fifth day. He then left the hospital.

Summary

1. Paludrine has an action on an attack of malaria comparable to that of quinine or mepaerine. Trials were given to three different courses of treatment, viz, (A) a single dose of 100 mg., (B) a single dose of 300 mg. and (C) 100 mg. three times a day for 4 days. The average duration of fever with (A) was 3 days and with (B) and (C) about 2½ days. The average period of asexual parasites in the blood was 2.6 days with (A) and 2.3 days with (B) and (C).

2. The asexual parasites disappeared from the blood of the majority of patients within three days—in 82, 88 and 93 per cent under regimens A, B and C respectively. The corresponding figures for temperature were 73, 88 and 89.

3. The drug acted more quickly on the falciparum than on the vivax parasites.

4. It had no action on the gametocytes.

5. Thirty-nine patients were kept under observation for a fortnight to a month (55 days in one case). Twelve of them had relapses which were very common (85.7 per cent) in group A and less so (29 per cent) in group B. There was no relapse in group C. Most of the relapses were cases of falciparum infection.

Conclusion

The small number of cases in our series and the short period of observation would not justify us in drawing any conclusions beyond stating that we feel that the single dose of 100 mg. was an unsatisfactory mode of treatment, as far too many relapses occurred after it. The single dose of 300 mg. was however more

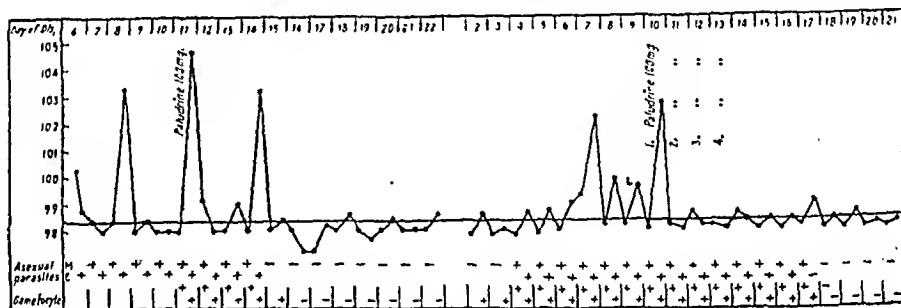


Fig. 9.—*P. malariae* infection treated with regime A: Relapse after 18 days treated with regime C.

promising, but the dosage of 100 mg. thrice daily for 4 days was more effective than either of the other two. The rationale of single dose treatment is first to control the acute attacks of malaria as quickly and conveniently as possible and then to give weekly or bi-weekly doses for

an indefinite period in order to prevent relapses (incidentally also as a prophylactic). Paludrine controls the acute attacks even with one dose of 100 mg. though this dose is not recommended in practice, and it remains to be seen whether it can prevent relapses by repeating it at regular intervals. This investigation will be carried out as opportunities arise.

Acknowledgment

We are grateful to Lieut.-Colonel C. L. Pasricha, I.M.S., Director of the School, for arrangement of special facilities and to Dr. H. Chakravarti and Mr. C. L. Mitter of this department for valuable assistance. Our thanks are also due to Dr. D. N. Roy, Professor of Entomology, for feeding mosquitoes on two patients and their subsequent dissection, and to Messrs. Imperial Chemical (Pharmaceutical) Limited, for a free supply of paludrine hydrochloride.

CLINICAL TRIAL OF PALUDRINE IN MALARIA

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A SUPPLY of paludrine for tests on malaria cases was made available to the Superintendent, Sir J. J. Group of Hospitals, Bombay, by the Director of the Malaria Institute of India. The authors carried out a series of clinical trials on confirmed cases of malaria from among patients of this hospital. This is perhaps the first report on tests carried out at Bombay on paludrine. In the present series, 50 cases were treated with different doses of paludrine. Only such cases were taken up for these trials as showed a typically clinical picture of malaria, confirmed by the presence of malaria parasites in the peripheral blood. After selection of the case, at least one paroxysm of fever was allowed to recur before the administration of paludrine. No other antimalarial drug was administered to these patients. Records were maintained of the temperature, occurrence of paroxysms and presence of malaria parasites in the peripheral blood.

This series of observations consisted of trials on 26 cases of B.T. infection, 20 cases of M.T. infection, 3 cases of quartan infection and one case of mixed M.T. and quartan infections.

The different dosages tried in this series are as follows: (i) 100 mg. of paludrine, single dose, (ii) 300 mg. in a single dose, (iii) 100 mg. once daily, (iv) 100 mg. once weekly, (v) 100 mg. thrice daily, and (vi) 200 mg. thrice daily. The cases treated under these dosages are tabulated in table I. The therapeutic efficacy of the drug was gauged by its effect on pyrexia, paroxysms and the occurrence of asexual forms of malaria parasites in the peripheral blood. Twenty-five cases (nos. 1 to 25) were followed up for periods of three weeks to 9 months with a view to observing if any relapses occurred. In

regard to the other 25 cases such follow-up was not possible owing to disturbed conditions in the city of Bombay at the time of this enquiry.

In the majority of the cases treated, it was observed that the single dose of 100 mg. paludrine was effective in bringing down the pyrexia and ameliorating the clinical symptoms. Ordinarily, the temperature came to normal within 24 hours; less frequently, the fever continued for 2 to 4 days. In one case of M.T. malaria, the fever continued for 9 days after the first administration of paludrine. It was generally observed that if the drug was given when the patient had pyrexia, the temperature reached the normal within 24 hours. If given during the afebrile period, either the next paroxysm was aborted or the attack, if it occurred, was of a comparatively mild type. In most of the cases treated, a second paroxysm did not occur, unless a relapse occurred after an interval of several days or weeks.

The different doses tried gave clinical cures in 48 out of 50 cases. From the small numbers of cases treated under the different dosage schemes, it is difficult to say which of these was the most effective one. Two cases of M.T. malaria of the cerebral type (nos. 46 and 47) did not respond to single dose treatment of 300 mg. paludrine; the patients died in four to six hours after administration. In such cases, paludrine does not appear to act sufficiently quickly to control the clinical condition.

In the majority of the cases treated, the asexual forms of the malaria parasite disappeared from the peripheral blood in one to three days after administration of paludrine and remained free from asexual forms unless a relapse occurred. In one case of M.T. infection, however, asexual parasites persisted in the peripheral blood for six days after the initial dosage (case no. 39). In contrast to the rapid disappearance of asexual parasites from the peripheral blood that generally followed the administration of paludrine, it was observed that the gametocytes of all the three species of malaria parasites persisted in the peripheral blood for prolonged periods, ranging from 4 to 20 days. In one case of B.T. infection (case no. 1), gametocytes persisted for as long a period as 90 days. Besides the persistence of gametocytes in the peripheral blood, a definite increase in the number of gametocytes was observed in many cases.

Out of 25 cases that were followed up, relapses occurred in seven cases. One case of M.T. malaria, treated with a single dose of 100 mg. paludrine, relapsed after 12 days (case no. 25). Three cases of B.T. malaria treated with 100 mg. weekly for 2 to 4 weeks relapsed in 2 to 3 months and one case of B.T. (case no. 1), treated with the same dosage for nearly six months, relapsed 2½ months after cessation of treatment. In the latter case, the attack may be due to a re-infection, as the person lived in a malarious area. One case of B.T. malaria

(case no. 22) that received 100 mg. paludrine daily for 8 days, relapsed after 3 months. Another case of B.T. malaria (case no. 2)

treated with 100 mg. thrice daily for 3 days relapsed after six months. Except for these seven cases, none of the other 18 cases followed

TABLE I

Case number	Infection	Total amount of paludrine administered, mg.	Disappearance of fever, in days	Follow-up period	Relapse
<i>Series I. 100 mg. single dose</i>					
7	B.T.	100	1	4½ months	—
8	B.T.	100	1	4½ "	—
10	M.T.	100	2	4½ "	—
11	M.T.	100	2	4½ "	—
14	B.T.	100	1	2½ "	—
17	B.T.	100	1	1 month	—
25	M.T.	100	1	4 months	+ after 12 days.
31	B.T.	100	1	Not followed up	
33	B.T.	100	1	"	
34	B.T.	100	3	"	
<i>Series II. 300 mg. single dose</i>					
18	B.T.	300	2	3 weeks	—
40	M.T.	300	1	Not followed up	
42	B.T.	300	1	"	
43	M.T.	300	3	"	
44	M.T.	300	1	"	
46	M.T.	300	Died in 4 hours— cerebral malaria.		
47	M.T.	300	Died in 6 hours— cerebral malaria.		
<i>Series III. 100 mg. daily</i>					
6	Q./M.T. mixed	600	1	4½ months	—
22	B.T.	800	4	3½ months	+ after 3 months.
29	B.T.	400	2	Not followed up	
30	B.T.	500	3	"	
32	B.T.	500	1	"	
35	B.T.	300	4	"	
45	M.T.	200	2	"	
<i>Series IV. 100 mg. weekly</i>					
1	B.T.	2,400	1	9 months	+ after 8½ months.
3	B.T.	600	1	6 "	—
5	B.T.	600	2	5 "	—
21	B.T.	200	1	6 "	+ after 3 months.
23	B.T.	400	1	5 "	+ " 2½ "
24	B.T.	400	1	5 "	+ " 2 "
39	M.T.	200	9	Not followed up	
<i>Series V. 100 mg. thrice daily</i>					
2	B.T.	900	2	7 months	+ after 6 months.
4	B.T.	900	2	5 "	—
9	M.T.	2,100	1	4½ "	—
12	M.T.	600	3	3 "	—
13	Q.	1,500	1	2½ "	—
15	M.T.	3,000	3	1½ "	—
16	M.T.	1,500	2	1½ "	—
20	Q.	1,500	4	3 weeks	—
28	Q.	600	1	Not followed up	
36	B.T.	800	3	"	
37	B.T.	600	2	"	
38	M.T.	1,500	1	"	
48	M.T.	1,500	2	"	
49	M.T.	1,500	1	"	
50	M.T.	1,500	1	"	
<i>Series VI. 200 mg. thrice daily</i>					
19	B.T.	1,800	3	3 weeks	—
26	B.T.	3,000	1	Not followed up	
27	M.T.	3,000	3	"	
41	M.T.	3,000	2	"	

up had any relapse and all of them remained free from asexual malaria parasites in the peripheral blood for the period that these cases were under observation.

Certain untoward symptoms were observed in six of the cases that received paludrine treatment. These symptoms were weakness, drowsiness, urticaria, vomiting and diarrhoea. In one case, the patient developed back pain, urticaria and desquamation. Another case had urticarial rash combined with drowsiness. The symptoms observed are set out in table II.

TABLE II

Case number	Dosage, mg.	Total drug administered, mg.	Untoward symptoms observed
3	100 weekly	600	Weakness and drowsiness.
4	100 t.d.s.	900	Back pain, urticaria and desquamation.
15	100 "	3,000	Diarrhoea.
19	200 "	1,800	Vomiting and diarrhoea.
20	100 "	1,500	Urticarial rash and drowsiness.
21	100 weekly	200	Weakness and drowsiness.

The occurrence of untoward symptoms showed no relation to the dosage of the drug. The symptoms appeared to be due to personal idiosyncrasies or individual susceptibility to the drug.

Although it is admitted that the number of cases treated in this series is too small to justify any broad conclusions, the results would show that paludrine is at least equal, if not superior, to other antimalarials in bringing about a clinical cure.

Acknowledgments

The authors are greatly indebted to the Superintendent, Sir J. J. Group of Hospitals, Bombay, for the facilities generously offered to them in this investigation. Thanks are also due to the Honorary Physicians of the Hospital who permitted their cases to be treated with paludrine.

PRELIMINARY REPORT ON A NEW SYNTHETIC ANTIMALARIAL

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and

K. D. CHHATRE, M.B., B.S.

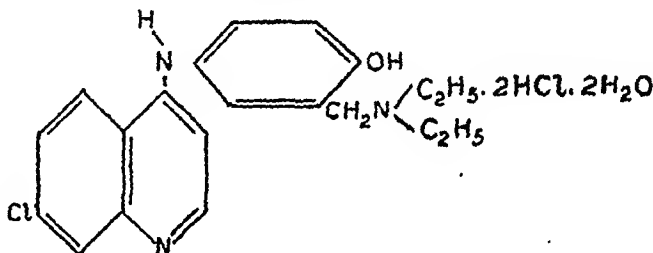
Assistant Director of Public Health, Kolhapur State

IN June, 1946 the Parke Davis Research Laboratories sent one of us (Simeons) a new compound which they called 'Cam-Aqi' for a clinical investigation of its antimalarial properties.

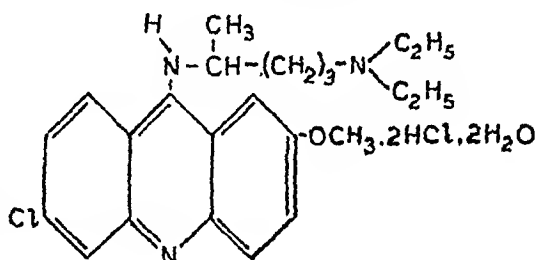
The new compound is 4(3' diethylaminoethyl 4'-hydroxyanilino)-7-chloroquinoline dihydrochloride dihydrate, a yellow crystalline powder of which one gram dissolves in 5 c.c. of water at 25 degrees C.

STRUCTURAL FORMULÆ OF:—

(I) "Cam-Aqi"



(II) Atabrine



The Parke Davis Research Laboratories furnished us with all the relevant data of their laboratory investigations. These showed that in avian malaria this compound is several times as effective as quinine and quinacrine (atabrine). The absorption from the gastro-intestinal tract is very rapid and high plasma levels are established in a short time. In laboratory animals the acute toxicity is about the same as that of atabrine, but in prolonged administration it was found to be only one-fourth to one-half as toxic depending to some extent on the animal species. The toxic symptoms in animals were found to be anorexia, vomiting, spasticity, clonic convulsions and death of respiratory failure; but the quantities necessary to produce such symptoms by prolonged administration in animals were several times greater than in the case of atabrine.

Though asked by the manufacturers to compare this new drug with other antimalarials in the clinic, it seemed to us from a study of the laboratory protocols given to us, that if this compound showed, in man, the low toxicity, the high therapeutic value, the rapid establishment of a high plasma level and the slow excretion observed in laboratory animals, it might, at last, be a real answer to the search for a drug with which all forms of malaria could be satisfactorily treated with a single oral dose. Instead, therefore, of making a comparative study we decided to investigate this possibility first.

As a starting point we chose arbitrarily a single dose of 10 mg./kg. body-weight.

We gave this dose to a series of 50 patients suffering from a clinical attack of malaria. Of these 39 were vivax and 11 falciparum infections. The patients were hospitalized, temperatures were recorded two-hourly. For the first 48 hours they were given only one tablet of ascorbic acid three times daily as a placebo. Parasites were visualized by the thick drop stained by the method described by one of us (Simeons, 1942). The blood was always examined again immediately before giving the single oral dose of the new drug and thereafter at regular intervals ranging from $\frac{1}{2}$ to 4 hours until complete and permanent clearance of peripheral blood was achieved. Falciparum crescents, when present at the time of giving the drug, were in no way influenced. This was to be anticipated from the structure of the compound.

It remained to establish whether in malignant malaria the formation of crescents could be suppressed in such cases as had no crescents at the time of giving the oral dose. All crescent-negative malignant cases were, therefore, examined regularly over a period of several weeks after the blood had been cleared of schizonts. In no case could we detect crescents appearing after the schizonts had been eliminated from the peripheral circulation. As their appearance after treatment with atabrine is a frequent and regular occurrence the new compound would appear to be decidedly superior in this respect. If the observation that the formation of crescents is suppressed while existing crescents are not affected is confirmed this would suggest an extraerythrocytic point of attack.

Clinical results

In all the 50 cases, mostly very heavy infections with parasites ranging up to 200 per oil-emulsion field in the thick drop, the clinical response to a single dose of 10 mg./kg. was dramatically sudden. The temperature chart appears to depend on the phase of the parasite cycle in which the dose is given. In no case did the temperature persist longer than 48 hours. When the dose was given between two rigors there was one further rise after which the temperature dropped to normal. When the dose was given at the height of the temperature or during its declining phase there was usually a rise between 100°F. and 101°F. on the following day. In some cases we noted an uninterrupted lytic fall of temperature spread over the next 36 hours. The average time required for the temperature to subside completely was 28 hours in the vivax cases and 27 hours in the M.T. cases, the difference being statistically insignificant.

The permanent clearance of the peripheral blood—excepting crescents which happened to be present at the time—ranged from a few hours to a maximum of 46 hours in B.T. and 40 hours

in M.T. The average clearance time was 23 hours for B.T. and 25 for M.T. cases.

Relapses

It is still too early to arrive at any definite conclusion regarding the relapse-rate after this single oral dose treatment. However, it is significant that so far not a single relapse has come to our notice in this series during a period of 3 months and more although we decided from the outset to count every clinical case of malaria occurring after treatment as a relapse even if it might have been a re-infection. The patients were all from the Kolhapur State Forces and therefore under continual observation. Though regular blood controls, at first daily and later weekly, were made not a single 'parasite relapse' was seen.

Toxicity

No toxic effects whatsoever came to our notice though very carefully searched for. The dose of 10 mg./kg. was given to a number of non-malarial cases suffering from advanced cardiac failure, cirrhosis of the liver, severe anaemia, advanced bilateral tuberculosis, typhoid and nephritis. In none of these cases could any effect, attributable to the drug, be detected. In no case was there a discoloration of the skin.

The dose

As the arbitrarily chosen dose of 10 mg./kg. showed such favourable results, further series with smaller doses were studied. In a series of 16 cases of which 10 were B.T. and 6 M.T. infections 7.5 mg./kg. was given. The average duration of temperature was 25 hours in B.T. and 35 hours in M.T. cases. No B.T. relapses were observed in this series, but among the 6 M.T. cases 2 relapses occurred both exactly 20 days after treatment. In this series a subnormal temperature was reached in an average of 25 hours in B.T. cases and 35 hours in M.T. cases. The average time required for the permanent clearance of the peripheral blood was 25.5 hours in B.T. infections and 35 hours in M.T. infections.

In order to see whether these less satisfactory results became progressively worse with a further decrease in dosage 17 further cases of which 8 were B.T. and 9 M.T. were treated with a single oral dose of 5 mg./kg. In this series 2 relapses occurred among the B.T. cases, one after 28 days and the other after 5 days, while 7 relapses occurred among the 9 M.T. cases after a period ranging from 10 to 30 days. In this 5 mg./kg. series the clearance of the peripheral blood took an average time of 32.5 hours in B.T. and 32 hours in M.T. infections. The average time required for the temperature to subside was 35 hours for B.T. and 41 hours for M.T. cases. These results are shown in the table.

Table showing the results observed with a decreasing single oral dose of 'Cam-Aqi'

Dose, mg./kg.	Number of cases		Relapses observed		Average time required for the			
					clearance of peripheral blood (in hours)		temperature to subside (in hours)	
	B.T.	M.T.	B.T.	M.T.	B.T.	M.T.	B.T.	M.T.
10	39	11	Nil	Nil	25	23	28	27
7.5	10	6	Nil	2	25.5	35	25	35
5	8	10	2	7	32.5	32	35	41

Thus it seems that 7.5 mg./kg. is sufficient to produce results equal to the 10 mg./kg. dose in B.T. but that in M.T. 7.5 mg./kg. is insufficient. These observations show a generally progressive increase in the time required for the peripheral clearance and the subsidence of the temperature and a regular increase in relapses with diminishing doses. We concluded that 10 mg./kg. was the minimum effective dose which would produce satisfactory results in both types of malaria and abandoned further work on the smaller dose although even the smallest dose of 5 mg./kg. appeared perfectly sufficient to control the clinical attack in every case.

A few cases were studied with a dose of 15 mg./kg. It appeared from these cases that this dose shortened by a few hours both the clearance time and the duration of fever, but this advantage did not seem to us sufficiently marked to compensate for the higher cost of treating patients with the 15 mg./kg. dose. As the 10 mg./kg. dose continued to show perfectly satisfactory results, we abandoned, for the present, a further investigation of higher doses. We must, however, mention that even in the 15 mg./kg. cases not the slightest evidence of any toxic results was observed.

A blanket treatment

In order to study this new compound in children we selected a Mission School Hostel with 110 inmates. During the preceding months there had been a considerable loss of attendance due to malaria—the diagnosis had been confirmed by a blood examination in every case—ranging up to 20 absentees per day. During the preceding month there had not been a single day without malaria absentees. Every child in this hostel was given a dose ranging from 5 to 7.5 mg./kg.—judged visually, not by actual weighing—all the children returned to their classrooms and none showed any untoward effects. On the following day 2 children who were actually suffering from fever at the time of treatment remained absent, on the 2nd day one of these children was absent and from the 3rd day onwards no further case of malaria occurred among these children for a period of 2 months.

The children then left the hostel for a short holiday and when they returned 2 children were found to be suffering from malaria. Both these cases had had malaria previously and can, therefore, be regarded as relapses, but both had had very small doses—one aged 17 had had a total of 200 mg. while the second case aged 12 had had only 100 mg. Both these relapses were treated with a full 10 mg./kg. dose. Apart from these 2 relapses no case of malaria has occurred during a period of over 5 months.

In the same school 116 day boys were given approximately 10 mg./kg. at a later date as among these too there had been a considerable absence due to malaria. During the following two months no case of malaria occurred in this group. None of these children showed any toxic symptoms.

In all 314 persons have been given the new drug without any ill effects. Unless further experience reveals contra-indications or idiosyncrasies which we happened to have missed, this compound can be considered non-toxic in the dose we have used.

We were unfortunately unable to observe the effect of the drug in quartan malaria but we can say that in our small series of B.T. and M.T. cases we found a single oral dose of not less than 10 mg./kg. to be at least as effective as a full course of treatment with any antimalarial known to us.

Field dosage

For practical field purposes it is obviously inconvenient to calculate the dose on body-weight. Messrs. Parke Davis supplied us with 50 mg. tablets. We suggest that 0.2 gm. tablets, grooved for halving, would be most convenient. For such tablets we would suggest the following schedule:—

Infants up to 2 years	..	$\frac{1}{2}$ tablet	0.1 gm.
Children from 2-5 years	..	1	0.2 gm.
Children from 5-14 years	..	$1\frac{1}{2}$ tablets	0.3 gm.
Average South Indian adults	2	"	0.4 gm.
Tall or heavy adults	..	3-4 "	0.6-0.8 gm.

If our findings are confirmed by other workers and in much larger series than we have so far been able to collect this new compound would represent a very real advance in malaria therapeutics as the advantages of a safe, single, oral dose treatment particularly for rural populations are too obvious to require elaboration.

A CLINICAL STUDY ON PALUDRINE

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and

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CLINICAL trials with this new drug were carried out in the ward of the senior writer

only on those patients whose blood showed malarial parasites. It was administered in various doses and the effects on the clinical course and also on the parasites were observed from day to day. Blood films were examined at intervals of 24 hours.

Altogether 58 cases were treated of which 20 had M.T. and the rest B.T. infection. None was given any antimalarial drug before admission

into the hospital. This study included 4 groups of cases having 4 different dosages.

Group 1 (vide table I).—In this group, there were 12 cases (4 M.T. and 8 B.T.). Paludrine was administered in doses of 1 tablet three times daily for 7 days and then twice daily for another 7 days. The patients were kept under observation for 2 to 3 weeks after the drug was discontinued and on discharge they were

TABLE I
Group 1

Serial number	Age in years	Duration in days before admission	BLOOD EXAMINATION				Maximum temperature during first 24 hours, in degrees	Temperature dropped to normal in hours	
			Type of infection	Parasites in blood					
				After 24 hours of treatment	After 48 hours of treatment	After 72 hours of treatment			After 96 hours of treatment
1	15	2	M.T.	+	+	—	—	103	72
2	14	2	M.T.	+	+	—	—	104	72
3	22	4	M.T.	+	—	—	—	103	72
4	26	7	M.T.	+	—	—	—	101	36
5	17	4	B.T.	+	+	+	—	104	72
6	35	3	B.T.	+	—	—	—	100	12
7	20	5	B.T.	+	—	—	—	103	72
8	27	5	B.T.	+	—	—	—	102	24
9	33	3	B.T.	+	—	—	—	104	60
10	22	3	B.T.	+	+	—	—	103.5	48
11	22	2	B.T.	+	—	—	—	104.5	80
12	35	5	B.T.	+	+	—	—	103	48

TABLE II
Group 2

Serial number	Age in years	Duration in days before admission	BLOOD EXAMINATION				Maximum temperature during first 24 hours, in degrees	Temperature dropped to normal in hours	
			Type of infection	Parasites in blood					
				After 24 hours of treatment	After 48 hours of treatment	After 72 hours of treatment			After 96 hours of treatment
1	18	8	M.T.	+	+	—	—	104	96
2	48	3	M.T.	+	—	—	—	101	12
3	29	10	M.T.	+	+	—	—	101	60
4	16	3	M.T.	+	+	—	—	102	72
5	25	5	M.T.	+	—	—	—	102	24
6	12	4	M.T.	+	—	—	—	101	48
7	50	4	B.T.	+	—	—	—	103	36
8	30	3	B.T.	+	—	—	—	104.5	72
9	12	5	B.T.	+	+	+	—	99	80
10	27	1	B.T.	+	—	—	—	101	60
11	23	1	B.T.	+	—	—	—	100	24
12	30	4	B.T.	+	+	—	—	101.5	80
13	42	3	B.T.	+	—	—	—	102	48
14	20	5	B.T.	—	—	—	—	98.6	6
15	21	3	B.T.	+	—	—	—	102	24
16	20	4	B.T.	—	+	—	—	103	36
17	60	30	B.T.	+	—	—	—	102	36
18	40	20	B.T.	+	—	—	—	101	48
19	75	2	B.T.	+	—	—	—	101	48
20	5	4	B.T.	+	+	—	—	104	72

TABLE III

Group 3

Group 3

Serial number	Age in years	Duration in days before admission	BLOOD EXAMINATION				Maximum temperature during first 24 hours, in degrees	Temperature dropped to normal in hours	
			Type of infection	Parasites in blood					
				After 24 hours of treatment	After 48 hours of treatment	After 72 hours of treatment			After 96 hours of treatment
1	24	9	B.T.	+	—	—	—	102	60
2	9	5	B.T.	—	—	—	—	103.5	48
3	65	3	B.T.	+	—	—	—	102	72
4	11	3	B.T.	+	—	—	—	103	36
5	50	5	B.T.	+	—	—	—	102	120
6	38	1	B.T.	—	—	—	—	..	24
7	18	2	B.T.	+	—	—	—	..	96
8	8	3	B.T.	+	—	—	—	..	24
9	12	90	B.T.	+	—	—	—	..	48
10	26	3	B.T.	+	+	—	—	..	48
11	16	5	B.T.	+	—	—	—	..	72
12	18	6	B.T.	+	—	—	—	..	24
13	30	17	B.T.	—	—	—	—	..	120
14	..	22	M.T.	—	—	—	—	..	24

TABLE IV

Group 4

Serial number	Age in years	Duration in days before admission	BLOOD EXAMINATION				Maximum temperature during first 24 hours, in degrees	Temperature dropped to normal in hours	
			Type of infection	Parasites in blood					
				After 24 hours of treatment	After 48 hours of treatment	After 72 hours of treatment			After 96 hours of treatment
1	25	7	M.T.	+	+	—	—	103	72
2	20	4	M.T.	+	+	—	—	102	84
3	20	5	M.T.	+	—	—	—	105	48
4	35	3	M.T.	+	—	—	—	100	24
5	30	5	B.T.	+	+	—	—	106.5	80
6	20	3	B.T.	+	—	—	—	101	48
7	20	3	B.T.	+	—	—	—	105	20

instructed to return immediately if they got any fever.

The parasites disappeared from the peripheral blood after 48 hours in 7 cases, after 72 hours in 4 cases and after 96 hours in 1 case only. The temperature became normal after 12 to 80 hours of treatment. All these patients felt so much well within 3 to 4 days that some of them insisted on going home or returning to work. They were however detained for our investigation until the full course of treatment was completed. No sign or symptoms suggesting any toxic effect was noticed.

Group 2 (vide table II).—In this group consisting of 20 cases (6 M.T. and 14 B.T.) paludrine was given in doses of 1 tablet 3 times daily for 7 days the observation period being the same as in the first group.

Two patients (nos. 4 and 6) were admitted with severe toxic symptoms and one of them (no. 4) was in a semi-conscious state. Parasites disappeared from the blood after 24 hours in 2 cases, after 48 hours in 12 cases and after 72 hours in 6 cases. Only in 1 case, parasites disappeared from peripheral blood after taking the tablets for 96 hours. Temperature subsided within 12 to 96 hours.

Group 3 (vide table III).—This consisted of 14 cases (13 B.T. and 1 M.T.). Paludrine was administered in doses of 1 tablet twice daily for 7 days. Parasites disappeared from peripheral blood after 24 hours in 4 cases, after 48 hours in 9 cases and after 72 hours in 1 case; the fever stopped within 24 to 72 hours. In 2 cases; however, the fever persisted for 120 hours. There was no relapse.

Group 4 (vide table IV).—This consisted of 7 cases. Paludrine was administered in doses of 2 tablets 3 times daily for the first 2 days and then one tablet thrice daily for the remaining 5 to 6 days. These were severe cases. The patients showed evidences of toxæmia and 2 of them were definitely unconscious. Blood films showed very heavy infection. Four of the cases were M.T. and 3 were B.T. infection but with high fever, signs of dehydration and drowsy state. Some of these patients were unable to swallow the tablets; in fact they could not be fed at all due to unconscious state. In these cases, the tablets had to be crushed, mixed with fluid and administered through a nasal tube. In 4 cases parasites disappeared from the peripheral blood after 48 hours and in 3 cases after 72 hours. Temperature subsided within 24 to 84 hours. None of them ended fatally and there was no relapse.

Group 5.—These cases were treated by another physician who has very kindly allowed us to publish his records. This group consisted of 5 cases and the course of treatment followed by him was 1 tablet thrice daily for 3 days only.

It will be seen from the above that paludrine is undoubtedly an effective remedy in malaria. It is devoid of a bad taste, has no toxic effects as far as it has been studied and so far it appears to hold out fair prospects of being effective against relapse. The period of observation has, however, not yet been long enough to confirm the last point.

It is obvious from the above records that although parasites disappeared from the peripheral blood within 48 to 72 hours in most cases, it took longer time before the patients became completely afebrile. It stands to reason that paludrine takes longer time to sterilize the blood and the parasites, though not detected in the peripheral blood, may be persisting in the internal organs. It is essential, therefore, to continue administration of the drug for a period longer than what would suggest from blood film examination. Some of the observers (M. N. Afridi) have given paludrine to his patients on trial treatments in 3 different doses, viz, a single dose of 1 tablet, a single dose of 3 tablets and two tablets twice a day for a maximum period of 3 days. It is interesting to note the results of his last regime, viz, that by giving 2 tablets twice a day for 3 days he was able to get a clinical cure in 84 per cent and parasites disappeared from the blood in 80 per cent of his cases. Fever stopped within 3 days in 71 per cent. The same observer states that 5 per cent of his cases got 2nd and 3rd attacks. These results appear to compare well with those of the writers. Perhaps the drug was not pushed enough and this might explain some of his failures and also the relapses.

How far paludrine can be used prophylactically for prevention of malarial infection cannot be definitely stated. This problem requires to be studied much more extensively and also by

different observers independently in different places. Although paludrine sterilizes the blood, such a sterilizing effect appears to disappear as the drug is excreted from the system. After this, the subject once more becomes liable to be infected by the parasites. This is the experience of other observers as well as of the present writers and it is very well illustrated in case 6, table IV, who came in first with B.T. infection and was treated with paludrine in doses of 1 tablet 3 times daily for 7 days and got completely cured. The same patient was again admitted into the hospital 2 months later and this time with severe M.T. infection. The patient was a girl student staying as a boarder in a local school where malaria was endemic for some time.

The administration of the drug in big doses in cases with pernicious symptoms is very interesting. It not only demonstrates that the drug is rapidly absorbed to produce a therapeutic effect but that even a considerable amount of the drug administered rapidly is without any untoward effect. In group 4, a large amount of drug was given, through nasal tube when patients could not swallow, and the results were very satisfactory.

The writers offer their thanks to the Superintendent, Medical College Hospitals, for permission to carry on the work in the wards of the hospital. They are also indebted to the Imperial Chemical Industries, Ltd., for supplying them with adequate quantities of the drug to carry on this investigation.

INVESTIGATION ON A CASE OF FEMINISM*

By P. DE, B.Sc., M.B. (Cal.), F.R.C.P. (Edin.), F.N.I.
and

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THE patient, a young male of between 16 and 17 years of age, was admitted to the Medical College Hospital on 19th January, 1946, with pronounced signs of feminism. He stated that about a year previously he began to suffer from frequency of micturition, with the passage of scanty and high-coloured urine. This was associated with a burning sensation in the urethra. He noticed also that his penis gradually got smaller and was reduced to about half of its original size within three months of the onset of his symptoms. Erection, which

* Read at the Physiology Section of the 34th Session of the Indian Science Congress held at Delhi in January 1947.

previously was normal, now became difficult and emission ceased altogether. Two months later he noticed a small swelling on his right nipple which on squeezing discharged a white viscid fluid. Next day the breast was swollen and painful and from that time both breasts gradually increased in size. He stated also that about the same time he began to suffer from frontal headaches and noticed some defect in his vision.

On examination, the most obvious feature was the well-developed breasts with prominent areolæ. They were firm and of a slightly granular texture on palpation. The areolæ were deeply pigmented. Nipples were flat with well-defined duct openings through which a little whitish viscid fluid could be expressed (figure 1, plate XI).

The patient was a fairly well-nourished individual. His skin was of a lighter shade than normal, fine in texture, smooth, and sparsely covered with fine hair. Axillary hair was scanty, while the pubic hair was feminine in pattern. Subcutaneous fat was more abundant over the chest and buttocks. There were no striæ present, but patchy areas of slight pigmentation showed on the anterior aspect of the left thigh and on the lower part of the abdomen.

The penis and testicles were smaller than normal, the left testicle more noticeably so than the right (figures 2 and 3, plate XI).

The voice was high pitched and feminine. This change was noticed by the patient himself two or three months after the onset of his symptoms.

The patient's general demeanour in hospital was good, though he suffered from occasional hysterical outbursts of weeping.

Pulse and respiration and temperature were normal. No abnormality was found in the chest or abdomen. Blood pressure 120/75 mm. X-ray examination of the skull showed no enlargement of the pituitary fossa (figure 4, plate XI).

Visual acuity, right eye 6/36, left eye 6/60, which did not improve with glasses. No abnormality was seen in the fundus. A scotometer test showed some contraction of the peripheral fields, but the test was difficult on account of the non-co-operative attitude of the patient. The central fields did not appear to be affected. The urine showed no qualitative abnormality. Urea content 0.65 per cent; urea clearance test gave an average value of 79.46 per cent of normal function. Friedman's test was negative. Estimation of the basal metabolic rate gave a value equivalent to 4 per cent, a result within normal limits. The W.R. was negative. Blood count was as follows: Hb. 40 per cent (Haldane), R.B.C.'s 2,100,000, W.B.C. 5,300, neutrophil polymorphs 61 per cent, lymphocytes 32 per cent, monocytes 5 per cent, eosinophils 2 per cent, basophils nil.

Biochemical examination of the blood gave the following results:—

Total protein	..	6.5625	per cent.
Albumen	..	4.8825	"
Globulin	..	1.680	"
N.P.N.	..	18	mg. per 100 c.c.
Urea	..	22	" " 100 "
Uric acid	..	2.1	" " 100 "
Creatinine	..	1.96	" " 100 "
Cholesterol	..	70	" " 100 "
Sugar	..	83	" " 100 "
Chloride	..	496	" " 100 "
Sodium	..	330	" " 100 "
Potassium	..	20.5	" " 100 "

Glucose tolerance test:—

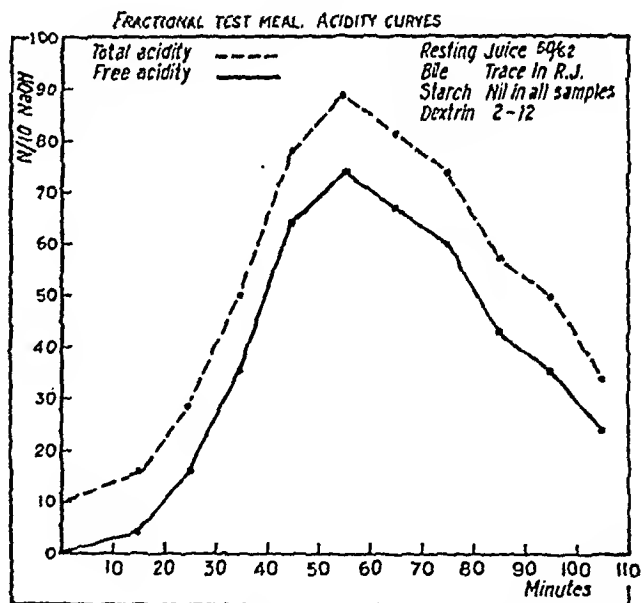
Fasting sample	..	0.076	per cent, urine, no sugar.
1st	"	0.088	"
2nd	"	0.104	"
3rd	"	0.090	"
4th	"	0.088	"

Stool examination (Cambridge):—

Total fat	..	30	per cent.
Unsaponified fat	..	19.6	"
Neutral fat	..	1.4	"
Free fatty acid	..	1.2	"

The result of a fractional test meal is shown in the following graph:—

GRAPH



After a stay of 6 months in hospital the cholesterol content of the blood returned to normal levels (110 mg. per 100 c.c.). Blood sugar 85 mg. and blood chloride 537 mg. per 100 c.c.

Unfortunately, the patient left the hospital before further investigations could be carried out. Extractions of urinary steroids have been made, and these are under investigation.

Discussion

At least two of the important steroids of the suprarenal cortex, viz, progesterone and androsterone, though present in small quantities belong to the group of sex hormones. All these hormones are more or less allied in their chemical structure, and can be divided into two groups,

depending on the presence or absence of an oxygen atom at C II in the steroid nucleus. Corticosterone and dehydrocorticosterone belong to the former and progesterone to the latter.

It is therefore not surprising that abnormality of the sex organs and secondary sex characters should be associated with hypo or hyperfunction of the cortical tissue.

As early as 1855, Thomas Addison described the syndrome now known as Addison's disease. This is due to degeneration, destruction, or deficiency of the suprarenal cortex. Subsequent observations on this condition have shown that depression of sex function is one of its chief features. It is known also that during pregnancy there is enlargement of cortical tissue.

Sexual abnormalities are characteristic features of cortical tissue tumours. Such tumours have been associated with premature sexual maturity in children by Bulloch and Sequeira (1905). Puberty in these children appears prematurely, there is great development of sex organs, and there may be precocious sexual desire.

Adult male subjects of cortical tumours seldom give any evidence of endocrine disturbance. A few only show exaggeration of masculine characters, whereas feminization is more commonly observed. In the latter, atrophy of the testes and penis, enlargement of the mammae, and a feminine distribution of fat are the main features.

We wish, however, to deal with some of the other features of hypo or hyperfunction of the cortical tissue which have a bearing on this case.

In Addison's disease and in other cases of hypofunction of cortical tissue, low blood pressure, low metabolic rate, loss of appetite, hypochlorhydria, decrease in plasma Na and chloride, increase in potassium concentration in plasma, in tissue fluids and in the tissue cells, rise in calcium content of the serum, dehydration and reduction of blood volume, hypoglycaemia, renal insufficiency, rise in blood urea and non-protein nitrogen have been observed.

Loeb *et al.* (1933) noticed an increased loss of sodium salt by the kidneys in experimental adrenalectomy. Marshall and Davis (1916) were the first to show an increase in blood urea and a diminution in renal function by the phenolsulphonephthalein test after removal of the adrenals. The urea clearance was also reduced, and there was an increase in creatinine and non-protein nitrogen in the blood. A fall in the basal metabolic rate has also been observed in the adrenalectomized animal after recovery by Webster, Pfiffner and Swingle (1932).

Thorn *et al.* (1936) have shown that in normal dogs and healthy persons, cortin reduces the excretion of sodium and increases that of potassium. The normal kidney function is restored to the greatest degree by desoxycorticosterone, which reduces the non-protein nitrogen of the blood, whereas corticosterone and dehydrocorticosterone, which possess an oxygen

atom at C II exert the least effect on water and salt metabolism. Desoxycorticosterone, on account of its effect on water and salt metabolism, increases the plasma volume and the sodium concentration in the body fluids, but the potassium concentration is reduced (Loeb *et al.*, 1933).

In normal and in adrenalectomized animals, Britton and Silvette (1932, 1934) have shown an increase in blood sugar and liver glycogen by administration of cortin. These effects are most strongly exerted by corticosterone and dehydrocorticosterone. Ingle (1941) has demonstrated that dehydrocorticosterone in 10 mg. doses a day causes hyperglycaemia and, in normal rats, glycosuria. The hyperglycaemia is due to gluconeogenesis, and there is an increase in the glycogen storage.

Ingle (1941) and Long *et al.* (1940) showed that glycosuria is produced by corticosterone and dehydrocorticosterone, by stimulating gluconeogenesis from protein, but the increase in the excretion of nitrogen is insufficient to account for the amount of glycosuria. It has therefore been surmised that the interference with oxidation of glucose might also be a contributory factor in the production of glycosuria.

From what has been mentioned above, it is evident that desoxycorticosterone exerts its effects primarily on water and salt metabolism and restores the renal function. It has little or no action on carbohydrate metabolism. Corticosterone and dehydrocorticosterone, on the other hand, markedly influence the latter, and have practically no influence on the metabolism of water and salt.

Lovatt Evans (1945) states that after hypophysectomy the inner layers of the adrenal cortex show a considerable atrophy. First the zona reticularis and then the zona fasciculata shrink and degenerate. These atrophic changes can be prevented by injection of adrenocorticotrophic hormone of the anterior pituitary. Injections of these extracts into normal animals produce hypertrophy of the inner layers of the suprarenal cortex. The cortical influence on the metabolism of protein, fat, and carbohydrate is most affected by the adrenotropic factor.

It may be suspected from this that the inner zones of the cortex secrete the hormone concerned with the control of the metabolism of these substances. The outer and newly formed cells of the zona glomerulosa of the cortex may either secrete enough hormone or a hormone of the right type to exercise control over the regulation of salt and water in the body after removal of the pituitary.

It will therefore be reasonable to conclude that the zona glomerulosa is responsible for the production of desoxycorticosterone, and the zona fasciculata and reticularis for the production of corticosterone and dehydrocorticosterone.

Some of the complex symptoms manifested by our patient; *viz.*, increase in sodium and chloride content of the plasma, reduction in urea,

and non-protein nitrogen of the blood, increase in plasma volume and diminution of plasma proteins, efficiently functioning kidneys, normal urea clearance and hyperacidity, are suggestive of hypersecretion of desoxycorticosterone from the outer zone of the adrenal cortex; whereas, the low normal blood sugar level and the increased glucose tolerance of the patient are indicative of hyposecretion of corticosterone and dehydrocorticosterone from the inner zones of the cortex.

It is rather a little difficult to conceive at first sight a primary condition of hyperactivity of the zona glomerulosa with hypoactivity of the zona fasciculata and reticularis of the suprarenal cortex. It is known, however, that hypophysectomy produces a considerable atrophy of the inner layers of the cortex.

In this patient the x-ray examination showed a normal pituitary fossa. Possibly the development of the pituitary proceeded normally till adolescence, when atrophic or degenerative changes started in the anterior pituitary with consequent reduction of its adrenotropic hormone. This produced degenerative or atrophic changes in the inner zones of the cortex, leading to diminished secretion of corticosterone and dehydrocorticosterone. The increased glucose tolerance of the patient lends support to this idea. Possibly there is also a hyposecretion of the growth or gonadotropic hormone, and a condition of sexual dwarfism has been produced, resulting in atrophy of his testes and penis, loss of sex function and fatness.

Some of the adrenal corticosteroids show androgenic or oestrogenic properties, and are similar in chemical structure with sex hormones, desoxycorticosterone has been proved to have a progesterone-like action, and progesterone and androsterone are present in the adrenal cortex.

It has been shown by several observers that a metabolic product of androgens in the body is oestrogen, probably in the form of oestrone. It is to be expected, therefore, that any disturbance of metabolism producing excessive amounts of steroids with androgenic or oestrogenic functions will produce alterations in the sex organs and secondary sex characters, depending on the relative amounts of active materials produced. The urine of this case contained an excessive amount of oestrone (500 I.U. per litre) as indicated by tests on ovariectomized mice, by the smear test introduced by Allen and Doisy (1927). The 4-injection method described by Emmens (1939) was followed.

No treatment was carried out on this patient while in hospital beyond special attention to his diet. After about 4 months' stay in hospital his general condition improved, he had partial restoration of libido, with emission. The improvement is in accord with our opinion that the underlying cause of his condition was a primary degeneration of the anterior pituitary, with hyperplasia of the zona glomerulosa of the adrenal cortex.

A point of some interest is the low cholesterol content of the blood. The physiological functions of this substance are little understood. Blood values may fluctuate considerably during the process of digestion, and they may be high in a number of pathological conditions. Low values are not so frequently seen. Defective absorption may have played a part in this case, but it is more likely that the main cause was a defect in its production from endogenous sources. This is only to be expected in view of the disturbed condition of the adrenal cortex. It is further of interest to note that with the improvement of the patient the blood cholesterol returned to its normal value.

Summary

1. History of a case of feminism in a young adult male, with laboratory findings, has been recorded.

2. The biochemical reports of the patient indicate a condition of hyperactivity of desoxycorticosterone, due to hyperplasia of the zona glomerulosa of the suprarenal cortex, and one of reduced activity of corticosterone and dehydrocorticosterone, due to atrophy or degeneration of the zona fasciculata and zona reticularis.

3. The degeneration of the inner zones of the cortex is due to reduced secretion of adrenotropic hormone of the anterior pituitary.

We wish to express our most grateful thanks to Dr. R. K. Callow who supplied us with literature, to Prof. P. Chatterjee for affording us all facilities for investigation and to Mr. Jagnewar Saha for the photographs.

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TREATMENT OF OSTEOARTHRITIS WITH INTRA-ARTICULAR INJECTIONS OF LACTIC ACID

By B. RAMAMURTHI, M.B., B.S.

DISEASES of joints (Sanskrit—Sandhi Vatha) and their manifestations have been well studied in ancient India (and also by the Egyptians). In India there seems to have been an understanding of the difference between the two types of chronic arthritis which we recognize now, namely the rheumatoid or the infective and the osteoarthritis or the degenerative type of the disease. They recognized two types—the one affecting the smaller joints and leading to crippling (Khallee Vatha) and the other 'causing atrophy and hypertrophy'. The symptoms of the latter were described as rigidity, atrophy and hypertrophy, fissuring of the bone, lipping, kyphosis when it affects the spine, fatigue, pain and swelling. The treatment for the latter condition followed the usual line of physiotherapy, application of medicated oils and thermogenic agents and massage and movements. Intake of buttermilk (which has a high lactic acid content and low pH) was stressed very much.

The normal synovial fluid contains about 2,000 cells per c.mm. It contains proteins (a little less than 2 per cent) of which mucin is the most important. The importance of this fluid is that in addition to acting as a lubricant it nourishes the central portions of the articular cartilage. Hence in conditions in which the properties of this fluid get altered we may expect the articular cartilage also to be affected correspondingly.

Normal synovial secretion has the same H ion concentration as blood. In traumatic arthritis it was found that the effusion into the joint had a pH of 5.8 for 2 or 3 days which changed over to alkalinity in about seven days (from 5.8 to 7.8). This was explained by the presence of sarcolactic acid as a fatigue product in the effusion. These joints returned to normality quickly. But in non-traumatic hypertrophic arthritis, the initial pH which was on the acid side 6.6 changed to pH 8 in a few days and remained more alkaline than blood and these joints showed much less tendency to quick recovery. Also, the intra-articular injection of lactic acid in cases of lax joint due to traumatic arthritis restored the functional activity early.

With these facts Waugh (1936) suggested treating rheumatoid arthritis with injections of lactic acid. Finding fairly good results, he also tried in other arthritis including degenerative arthritis of big joints and found good results. He suggested that the acidity excites a polymorphonuclear leucocytosis followed later by local mesoblastic proliferation and this helps in the clinical improvement. Also the change in the pH helps to nourish the cartilage better (though we found that the change in pH lasts only about three weeks).

Crowe (1944) reports on 284 painful joints conditions including osteoarthritis treated with intra-articular injections 1 per cent acid potassium phosphate in isotonic solution. He found lasting improvement in 3/5ths of the patients and temporary improvement in the remaining 2/5ths.

This paper reviews 120 cases of osteoarthritis treated by intra-articular injections of lactic acid in the Orthopaedic Department of the Government General Hospital, Madras, during 1945. This does not include cases of osteoarthritis given physiotherapy, liniments, etc., or operative procedures as arthrodesis, arthroplasty, cheilectomy, synovectomies, and denervation of sensory nerves.

The cases reviewed here were all degenerative arthritis of big joints. The diagnosis was made by the age and the build of the patient, the clinical history, the affections of the big joints, and the nature of the pain (most acute in the morning when the patient gets up and wearing off by noon to come on again with fatigue in the evening) and in many cases the diagnosis was confirmed by x-rays. Diabetes and albuminuria were excluded. Erythrocyte sedimentation rate was not taken in these cases as it was considered that increase in the blood sedimentation rate is not even a fairly constant factor in degenerative arthritis of the big joints.

In a few cases with a little effusion, the pH of the fluid was tested before the injection, 48 hours after the injection and three weeks later. It changed from pH 8 before the injection to 7.2 in 48 hours. In three weeks it was again at 7.8 or 8. For 48 hours at least after the injection the pH was on acid side of blood (i.e. normal synovial fluid pH). In three weeks it came back to original level of pH but the clinical improvement had lasted.

X-rays taken before the injection and after do not show any appreciable change corresponding with clinical improvements.

The joints treated were hip 16, knee 81, ankle 6, shoulder 12, and wrist 5. Of these 10 cases were due to some change in the weight bearing mechanism like genu valgum, old fracture calcaneus, etc.

The methods of approach to the joints were of an orthodox nature and have been described by many. With full aseptic precautions, 15 c.c. of lactic acid of pH 5.4 (prepared by the Madras Medical College Biochemistry Department) with 1 c.c. of novocaine 1 per cent, were injected into the joint. For smaller joints, smaller quantities were given (wrist and ankle 7 c.c., shoulder 10 c.c.). After the injection the joint was moved once through its full possible range of movement. The patient was sent home and allowed to move about. Care was taken to see that the injection was intra-articular as a few cases in which the injection happened to be extra-articular had very severe pain even during the injection.

The immediate sequel in many cases was slight tension and pain in the joint which subsided from 24 to 48 hours. The average time taken for the pain and stiffness to disappear was from 5 to 7 days. In many cases the result was lasting from 8 to 16 months in 50 per cent of the cases. In some a second and even a third injection was required and these were given at fortnightly intervals (in 20 per cent of cases). In bilateral cases one joint was injected 15 days after the other.

The cases where the osteoarthritis was due to some upset of the weight bearing mechanism had only temporary relief. Shoulder joint cases also did not show satisfactory results.

One feature which was noted was that about 20 per cent of patients had very severe pain and swelling of the joint within 2 to 3 hours of the injection. In some cases it was known that the injections were given extra-articular by mistake and these patients got pain during the injection itself. Good results have been reported with peri-articular injections of lactic acid with novocaine, but in the painful cases in our series (20 per cent) the pain came on late, lasted for about three to five days and was very severe; these cases have shown lasting improvement.

The increased range of movement with relief of pain that results from the injection is a boon to the poorer classes of patients as it helps them to squat on the floor as most of our patients were of the working class type.

In a review in the *Medical Annual*, 1946 (p. 303), it is mentioned that the intra-articular and peri-articular injection of novocaine (which is added to the lactic acid) with the movements through which the joint was put to, after the injection, was responsible for the improvement rather than the lactic acid itself. But in the above series the injection of lactic acid was given intra-articular with only a very small quantity (1 c.c. of novocaine) and the joint was moved only once through the full possible range and not as in manipulation of joints. These cases (at least 50 per cent) have shown very good clinical and subjective improvement. We have to infer that the changes in pH of the synovial fluid has something to do with the improvement.

A report on one of the cases.—Kanniammal, a housewife, aged 50, had pain in the right knee with creaking for the past six months. She could not squat on the floor and the pain was very severe in the morning when she got up. The joint was not swollen. There was crepitus present on movement and the last 40 degrees of flexion was not possible. The other joints were normal. The patient tended to be fat. On 18th September, 1945, 15 c.c. of lactic acid with 2 c.c. of novocaine were injected intra-articularly. She had some pain on the day of injection. This disappeared and in a week she was able to squat on the floor though creaking had persisted. Till now she has had no recurrence of pain.

My thanks are due to Dr. N. S. Narasimhan, F.R.C.S. (Eng.), F.R.C.S. (Ire.), Orthopaedic Surgeon, General

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SEROLOGICAL TECHNIQUE (contd.)

By S. D. S. GREVAL

LIEUTENANT-COLONEL, I.M.S.

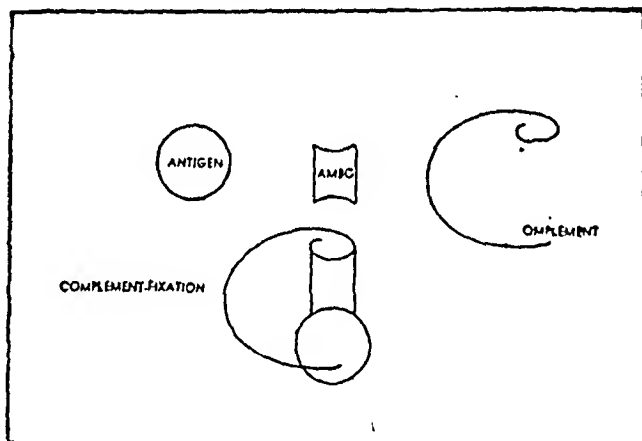
(From the Laboratory of the Imperial Serologist and Chemical Examiner to the Government of India, School of Tropical Medicine, Calcutta)

COMPLEMENT-FIXATION

THE COMPLEMENT

SOME antigen-antibody reactions do not become complete without an aid from the fresh serum. The immunological reagent which gives the aid and completes the reaction is the complement. In giving the aid it is exhausted or fixed: Hence the reaction of complement-fixation. The antibodies needing the complement are amboceptors.

Complement-fixation



(From COMPLEMENT-FIXATION FOR CLINICAL PURPOSES by Lieut.-Colonel S. D. S. Greval, I.M.S.; published by Messrs. U. N. Dhur and Sons Ltd., 15, Bankim Chatterjee Street, Calcutta.)

The complement is present in almost every vertebrate (the mouse is a known exception), but for the purpose of the reaction it is obtained from a guinea-pig. At least three male guinea-pigs are bled, under ether anaesthesia, from the heart, each yielding 3 to 4 c.c. and recovering completely for another yield after a week.

[For the purpose of ensuring a week's rest the animals are divided into batches and each batch coloured distinctively. Six convenient colour schemes are: (1) red entirely, (2) blue entirely, (3) yellow entirely, (4) red right and blue left, (5) red right and yellow left, and (6) blue right and yellow left.]

The blood is collected in a wide mouthed bottle and allowed to clot at room temperature for $\frac{1}{2}$ hour, the bottle lying on its side on a special

stand. The clot is then incised in two places along its length and the bottle left in the cold for a convenient and constant period, so turned that the clot is now in the upper part of the bottle. The clear serum oozing from the clot collects in the lower part of the bottle and is preserved by the cold. Before use the serum is transferred to another bottle and centrifuged (in chilled tubes) if necessary. *It should not be agitated violently at any stage*, beginning with the emptying of syringes into the bottle. The complement-containing serum is called the complement.

The reaction when used in detecting the presence of an antibody by means of a known antigen or the presence of an antigen by means of a known antibody is known as the complement-fixation test. Both terms, reaction and test, are often used interchangeably.

The natural complement present in a serum to be tested is destroyed by heating the serum at 55° to 56°C. for ½ hour or by aging it without freezing. The serum is then *inactivated*.

Apparatus, chemicals, etc., used in complement-fixation reaction: 1. *Apparatus non-expendable.*—1. Refrigerator or ice-box. 2. Autoclave. 3. Oven. 4. Steamer. 5. Water bath at 56°C. 6. Water bath for evaporation. 7. Incubator. 8. Centrifuge. 9. Seitz filter. 10. Racks for tubes, metal and wooden. 11. Stills, copper and glass. 12. Pestle and mortar, glass. 13. Syringes, 20 c.c., 5 c.c., 1 c.c. and needles, steel and platinum. 14. Lumbar puncture needle, platinum. 15. Sahli, haemometer. 16. Glazed jars for digestion with acids. 17. Desiccators. 18. Vacuum pump, etc. 19. Bunsen burners. 20. Spirit lamps. 21. Platinum wire, thick and thin. 22. Chemical balance. 23. Hand lens. 24. Wire gauge (L. S. Starrett Co., U.S.A.). 25. Soxhlet apparatus. 26. Sand bath. 27. Glycerine bath. 28. Condenser. 29. Reflux condenser.

2. *Apparatus, expendable.*—1. Graduated pipettes, 10 c.c. and 1 c.c. measuring to tips. 2. Test tubes, 3 × ½, 4 × ½, 5 × ¾. 3. Measuring cylinders, 1,000 c.c., 100 c.c., 10 c.c. 4. Centrifuge tubes, 10 c.c. graduated. 5. Flasks, 1,500 c.c., 100 c.c. and 50 c.c. 6. Beakers, nests. 7. Stoppered bottles, narrow and wide mouth. 8. Glass funnels. 9. Glass phials, 4 oz. and 1 oz. 10. Filter papers. 11. Filter discs. 12. Glass marking pencils. 13. Plasticine. 14. Cotton wool. 15. Glass wool. 16. Corks. 17. Rubber gloves. 18. Rubber tubing. 19. Glass rods. 20. Glass tubing.

3. *Chemicals.*—1. Iodine. 2. Alcohol. 3. Ether. 4. Acetone. 5. Collodium flexile. 6. Trikresol. 7. Cholesterol. 8. Sodium chloride. 9. Silver nitrate. 10. Sodium citrate.

4. *Cleaning of glassware.*—Details given under HAEMAGGLUTINATION apply.

THE HAEMOLYTIC SYSTEM

It consists of (i) rbc, (ii) an appropriate haemolytic amboceptor, and (iii) the complement. When the three constituents are mixed the rbc are haemolysed. The quantities are so adjusted that a complete haemolysis of the rbc occurs and provides a constant measure of the complement.

The RBC

Usually sheep rbc are used. Whole blood is taken (from the external jugular vein, with sterile precautions, in a record syringe) and diluted with an equal volume of 1.5 per cent sodium citrate in normal saline. It is washed three times. The deposit is measured and resuspended in normal saline to make suspensions of desired strength.

For preparing the haemolytic amboceptor a 50 per cent suspension is necessary (*vide infra*).

For preparing the usual haemolytic system a 6 per cent suspension is prepared (6 c.c. deposit + 94 c.c. saline or smaller volumes similarly made) and standardized colorimetrically. Seven drops of the suspension measured with the standard pipette (delivering 50 drops to 1 c.c.) should give a reading of 51 on Sahli's haemometer, following Sahli's procedure of lysing the rbc. If the reading is higher, proportionately more saline is added to the stock suspension thus:

It is found that the stock suspension measuring 100 c.c. gives a reading of 60; it should be made up to

$$\frac{60 \times 100}{51} \text{ c.c.} = \frac{6,000}{51} \text{ c.c.} = 117.8 \text{ c.c.}$$

The outgoing seven droplets can be ignored.

Smaller volumes are adjusted similarly. If the reading is lower, more deposit of rbc is added to bring it up to 51 or higher.

If the deposit is firm a higher initial reading is more likely.

Other things being equal, a stronger suspension yields a less sensitive haemolytic system: Hence the need for the standardization of the rbc suspension. The method described for the standardization is obviously superior to those depending on coal gas in the laboratory or complicated mathematical formulae.

The rbc are the antigen of the haemolytic system.

The Haemolytic Amboceptor

Amboceptor = both receptors (*vide diagram of complement-fixation*).

A sheep-rabbit haemolytic amboceptor is used. Full grown rabbits (weighing about 3 lb. in Calcutta) are injected in the ear vein with 50 per cent suspension of the rbc, on 3 successive days, thus:

- 1st injection, 1st day, 1 c.c.
- 2nd injection, 2nd day, 2 c.c.
- 3rd injection, 3rd day, 4 c.c.

Four days after the 3rd injection a sample of blood is taken from the ear vein for testing. 0.1 c.c. sucked in a capillary pipette, by means of a rubber teat, suffices. The blood is moved up the stem about 3 centimetres and the end of the pipette sealed quickly over a flame. The clear serum is collected below the clot and inactivated by immersing the stem of pipette in water between 55 and 56°C. for $\frac{1}{2}$ hour. The sealed end is then broken and the serum deposited as a droplet on a clean slide. The inactivated amboceptor-containing serum is called the amboceptor. From the droplet enough serum for a drop measuring $\frac{1}{50}$ c.c. is picked up again in a standard capillary pipette. The following dilutions are prepared, thus :

- (1) 1 standard drop + 2 c.c. saline
from which 1 standard drop
has been removed (in a
 $3 \times \frac{1}{8}$ tube) = 1 + 99
= 1 in 100
- (2) 1 c.c. dil. (1) + 9 c.c. saline
(in a $5 \times \frac{1}{8}$ tube) = 1 in 1,000

The test is performed (in $3 \times \frac{1}{8}$ tubes in a metal rack or $4 \times \frac{1}{8}$ tubes in a wooden rack) as follows :—

Tube number	..	..	1	2
3 per cent rbc suspension (prepared from the 6 per cent suspension)	..	..	1 vol.	1 vol.
Ambo. dil., 1 in 1,000	..	..	1 vol.	Nil
Saline	..	..	1 vol.	2 vol.

Tubes shaken and left in the incubator at 37°C. for $\frac{1}{2}$ hour, at room temperature 5 minutes and in the cold for $\frac{1}{2}$ hour.

Complement dil., 1 in 10	..	1 vol.	1 vol.
Tubes shaken and left in the incubator at 37°C. for $\frac{1}{2}$ hour.			

The volume conveniently may be 0.25 c.c. Any other volume kept constant will do equally well.

The result should be :—

Tube 1	Tube 2
Hæmolysis complete or partial, — or ± respectively.	No hæmolysis, +

If the amboceptor is up to the standard the hæmolysis should be complete. The tube should be crystal clear and ruby red.

Tube 2 will show that the rbc themselves are in order and unaffected by any other agent. They sink down as a red and opaque column surmounted by a clear and colourless column.

If the amboceptor of the sample is effective in a 1 in 1,000 dilution, the rabbit is bled from the heart 10 days after the last injection and about 10 c.c. of blood are collected.

If the amboceptor is not effective in a 1 in 1,000 dilution, the rabbit is given another course of rbc suspension, beginning on the same day, and the test repeated.

(When another course of injections is started only 4 days after the last injection, anaphylaxis does not occur. If there is a delay of over a week between the courses, the first injection of the subsequent course is given intraperitoneally. Following this plan the same rabbits are used for producing amboceptor again and again, without any mishap to the animals or deterioration in the amboceptor.)

Minimal hæmolytic dose, M.H.D., of hæmolytic amboceptor.—Of a satisfactory amboceptor the lowest limit of action is determined by titration. Eleven dilutions are made (in $5 \times \frac{1}{8}$ tubes) as follows :—

- (1) 0.5 c.c. ambo. + 4.5 c.c. saline = 1 in 10
- (2) 0.1 c.c. (1) + 9.9 c.c. saline = 1 in 1,000
- (3) 1 c.c. (2) + 1 c.c. saline = 1 in 2,000
- (4) 1 c.c. (2) + 2 c.c. saline = 1 in 3,000
- (5) 1 c.c. (2) + 3 c.c. saline = 1 in 4,000
- (6) 1 c.c. (2) + 4 c.c. saline = 1 in 5,000
- (7) 1 c.c. (2) + 5 c.c. saline = 1 in 6,000
- (8) 1 c.c. (2) + 6 c.c. saline = 1 in 7,000
- (9) 1 c.c. (2) + 7 c.c. saline = 1 in 8,000
- (10) 1 c.c. (2) + 8 c.c. saline = 1 in 9,000
- (11) 1 c.c. (2) + 9 c.c. saline = 1 in 10,000

The first dilution is made with saline containing 0.3 per cent trikresol and can be preserved for use indefinitely in the cold.

For dilutions (4) to (11) smaller quantities in the same proportion can be mixed. In the series given there is an automatic visual check provided by a graded increase in volume.

The dilution 1 in 1,000 is put up in two tubes again like the ear vein sample. (This step may be omitted when the complement and the rbc are being used in the routine of the laboratory and tested in the usual controls.) The dilutions 1 in 1,000 to 1 in 10,000 are put up like the first tube of this test, as shown in the TABLE OF TITRATION OF HÆMOLYTIC AMBOCEPTOR.

The last ruby red and crystal clear tube gives the titre of the amboceptor. If the 5th tube, for instance, is such a tube, the titre is 1 in 5,000. The titre is the MHD.

It will be observed that the dose is a dilution, unlike the dose of posology which is a quantity. The reason is that as the volume is kept constant the variation in the dose can only be effected by varying the dilution. The dilution therefore is the dose.

It will be also observed that the titre is given by the initial dilution unlike the titre of an agglutinating series in bacteriology, which is given by the ultimate dilution.

An amboceptor the MHD of which is below 1 in 1,000 will, of course, be rejected and not titrated at all. The one MHD of which is above 1 in 10,000 will also be rejected. When the tubes are in the incubator for the final result, they are examined after 15 minutes, 25 minutes and 30 minutes to watch the progress of hæmolysis. It should start at the left and proceed orderly towards the right. If the last tube is nearly completely hæmolysed after 15 minutes only and completely hæmolysed after

A TABLE OF TITRATION OF HÆMOLYTIC
AMBOCEPTOR

Tube No. :—	1	2	3	4	5	6	7	8	9	10
1 vol. of ambo. in a dilution of 1 in :—	1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000	10,000
Sheep rbc 3 per cent :—	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.
Saline :—	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.
Tubes shaken and left in the incubator at 37°C. for $\frac{1}{2}$ hour, at room temperature for 5 minutes and in the cold $\frac{1}{2}$ hour.										
Complement dilution 1 in 10 :—	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.
Tubes shaken and left in the incubator at 37°C. for $\frac{1}{2}$ hour.										

25 minutes, it must be presumed that the titre goes beyond 1 in 10,000.

It will be observed that the MHD of the amboceptor is determined in an excess of complement.

The usual sensitized rbc suspension used in complement-fixation.—It consists of 3 per cent rbc sensitized with 5 MHD of amboceptor and is prepared thus :—

—If the MHD is 1 in 5,000, a dilution 10 times as strong is prepared, i.e., 1 in 500. It has in a volume 10 MHD.

—A volume of this dilution is mixed with an equal volume of 6 per cent rbc.

The result is 3 per cent rbc sensitized with 5 MHD of amboceptor. The mixture is incubated at 37°C. for $\frac{1}{2}$ hour and left in the cold $\frac{1}{2}$ hour.

The Complement

The collection of this reagent has already been described.

Minimal hæmolytic dose, MHD, of complement.—Dilutions are made (in $5 \times \frac{5}{8}$ tubes) as follows :—

(1) 0.5 c.c. complement + 4.5 c.c. saline	= 1 in 10
(2) 1 c.c. (1) + 1 c.c. saline	= 1 in 20
(3) 0.7 c.c. (1) + 1.4 c.c. saline	= 1 in 30
(4) 0.5 c.c. (1) + 1.5 c.c. saline	= 1 in 40
(5) 0.4 c.c. (1) + 1.6 c.c. saline	= 1 in 50
(6) 0.4 c.c. (1) + 2 c.c. saline	= 1 in 60
(7) 0.3 c.c. (1) + 1.8 c.c. saline	= 1 in 70
(8) 0.3 c.c. (1) + 2.1 c.c. saline	= 1 in 80
(9) 0.3 c.c. (1) + 2.4 c.c. saline	= 1 in 90

The quantities of the 1 in 10 dilution and saline are written down on the tubes with glass marking pencil. The tubes are charged separately with individual quantities picked up in the pipette. *Calculation on the stem of the pipette must never be attempted.*

These dilutions are put up with a constant volume of 3 per cent rbc sensitized with 5 MHD of amboceptor as shown in the TABLE OF TITRATION OF COMPLEMENT.

The tube without the complement should not be affected.

The last crystal clear and ruby tube gives the titre of the complement. If the 5th tube, for instance, is such a tube, the titre is 1 in 60.

The titre is the MHD.

Usually it is not necessary to go beyond the 8th tube, i.e., 1 in 90 tube.

A complement not active in a 1 in 20 dilution is discarded. A highly coloured pink or brown complement which is likely to impart a tinge to the total fluid, in its *ultimate* dilution, is also discarded. The ultimate dilution will, of course, depend on the titre. Thus, while a coloured complement of high titre may be used the one of a low titre must be rejected.

It will be observed that the MHD of the complement is determined in an excess of amboceptor.

The complement completes the action between the rbc and the hæmolytic amboceptor.

A TABLE OF TITRATION OF COMPLEMENT

Tube No. :—	1	2	3	4	5	6	7	8	9	10
1 vol. (0.25 c.c.) of complement, diluted 1 in :—	20	30	40	50	60	70	80	90	100	No comp.
Saline :—	2 vol.	2 vol.	2 vol.	2 vol.	2 vol.	2 vol.	2 vol.	2 vol.	2 vol.	3 vol.
3 per cent rbc sensitized with 5 MHD amboceptor :—	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.

Incubated at 37°C. for $\frac{1}{2}$ hour.

Further, 1 MHD of complement will hæmolyse 1 volume of the 3 per cent suspension of rbc sensitized with 5 MHD. Less than 1 MHD will fail to do so: Herein lies the constant measure of the complement.

THE PRINCIPLE OF COMPLEMENT-FIXATION

Two systems depend upon the same restricted quantity of complement for the completion of their action. The first system is the supposed antigen-antibody system, such as the Wassermann antigen and the serum of a patient suspected to be suffering from syphilis. The complement is first presented, in a tube, to such a combination and the tube incubated. Later, the sensitized rbc are added to the same tube and the tube incubated again.

Three results are obtained:—

1. The rbc remain unaffected (+) = no complement available for them in the tube = complement-fixation by the 1st system = antigen-antibody relationship between the WR antigen and the patient's serum = WR positive = presumption of syphilis.

2. The rbc are hæmolyzed (—) = complement available for them = no complement fixed by the 1st system = no antigen-antibody relationship between the WR antigen and the patient's serum = no complement-fixation by the 1st system = WR negative = no presumption of syphilis.

3. The rbc are only partly hæmolyzed (T, trace of hæmolysis; ± appreciable hæmolysis) = only partial fixation of complement by the 1st system = WR doubtful = presumption of syphilis based on history alone. On doubtful reactions more will be said later.

(To be continued)

A TYPICAL CASE OF ISO-IMMUNIZATION AGAINST THE RHESUS FACTOR

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CASES of congenital hæmolytic disease (Erythroblastosis foetalis) and hæmolytic transfusion reactions due to iso-immunization against the Rhesus factor have not been reported in India. Greval *et al.* (1946) reported an unsuccessful search for cases of Erythroblastosis foetalis in the maternity hospitals of Calcutta. Khanolkar and Sanghvi (1945) did not find a single case among 3,000 consecutive labour cases admitted to the Nowrosjee Wadia Maternity Hospital, Bombay. Enquiries by the writer in Madras and other centres throughout India in the course of his tours have been equally unsuccessful.

Studies to date on the incidence of the Rh factor in the Indian population have shown that the frequency of Rh negative individuals is lower in India than in European countries and

America. Greval and Roy Chowdhury (1943) found it to be 10 per cent in Calcutta, Khanolkar and Sanghvi (1945) 2 per cent in Bombay while Ranganathan *et al.* (1946) found it to be 4.1 per cent in Madras. Wiener (1945) has recorded an incidence of 7.1 per cent among 156 Asiatic Indians tested by him in New York. The incidence of Rh negative individuals is therefore not so low in India as to account for the extreme rarity of cases of Erythroblastosis foetalis and hæmolytic reactions due to iso-immunization against the Rhesus factor. It is now known that not only a Rh negative, but even a Rh positive person may be sensitized and a person of one Rh subgroup can form antibodies against the antigen of another subgroup. Further the larger number of children born in each family in India may be expected to result in a larger number of affected children. It would therefore appear that cases of hæmolytic disease of newborn have hitherto escaped recognition for want of proper laboratory investigation as in the case reported below.

Greval *et al.* (1946) have recently recorded a presumptive case of Erythroblastosis foetalis due to Rh incompatibility. Investigation of a patient recently referred to the writer by Dr. G. N. Bahadur of New Delhi has revealed such conclusive evidence of iso-immunization of the mother against the Rh factor that it is considered of sufficient clinical interest for publication.

Past history.—Mrs. P. R., aged 26 years, has been married seven years and been pregnant seven times. No history of previous blood transfusion.

First and second pregnancies terminated in abortion about the 3rd month in December 1939 and August 1940 respectively.

Third pregnancy went on to full term after a threatened abortion in the 3rd month and a healthy female baby was born on 26th October, 1941. The child is now 5 years and well.

Fourth pregnancy ended in an abortion in the 3rd month in August 1942.

Fifth pregnancy. A male baby was born on 17th November, 1943. It remained well on the first day but became 'pale' on the 2nd day and died on the 3rd day after birth.

Sixth pregnancy. A normal male child was born on 20th February, 1945. On the 2nd day after birth the child was noticed to become yellowish which the doctor diagnosed as jaundice. The baby was given an injection (presumably intramuscular) of mother's blood. The baby died on the 4th day.

Seventh pregnancy. A healthy looking male baby was born on the 25th August, 1946. Jaundice developed on the 2nd day and rapidly became severe. The baby died on the 4th day.

The mother's blood was tested in March 1945 and found to be doubtful to Kahn test. She was treated by a course of 12 injections. Subsequent blood tests are reported to have been negative.

Investigation.—Neither anti-Rh serum nor known Rh negative and Rh positive cells were available and evidence for the presence of 'atypical antibodies' in the mother's blood had to be looked for without the use of these reagents. Fortunately there are now *in vitro* tests for Rh sensitization which do not require anti-Rh sera for performing them.

It is proposed to review the tests briefly in order that when suspected cases are encountered in future preliminary investigations on similar lines may be carried out. The tests are:—

1. The Diamond-Abelson test (Diamond and Abelson, 1945).

2. Wiener's conglutination test (Wiener, 1945a).

3. Chown's capillary tube test (Chown, 1944).

Diamond-Abelson test.—This is a simple and rapid slide test. Approximately 0.2 c.c. each of fresh oxalated group O, Rh negative and group O, Rh positive cells of different specificities are placed on a slide, and to each is added 0.1 c.c. of the serum to be tested. The slide is gently rotated and repeatedly tilted. The reaction is accelerated by warming the slide to 37°C. but the test is easily performed at room temperature. The reaction is read on a ground glass or white surface. If the serum is from a sensitized person, agglutination visible to the naked eye appears in one to three minutes. In practice, it is not necessary to measure out the serum or cells accurately. One drop of blood from the finger is mixed with about an equal amount of serum. Nor is it necessary to be particularly concerned about the specificity of the red cells used if the test is set up with several different specimens of Rh positive blood. The infant's or father's red cells, if of the same blood group as that of the mother, may be used as the test cells. The mother's cells may be conveniently employed as the Rh negative control. The chief source of error in interpretation is due to rouleaux formation. A drop of saline solution added to the mixture with restirring and agitation reveals the difference between true agglutination and rouleaux formation.

The conglutination test.—It differs from the tube 'agglutination test' in the substitution of normal compatible human plasma or serum in place of normal saline solution as a diluent. Thus the 2 per cent cell suspension is made up in plasma or serum instead of in saline solution. Similarly when the titration technique is followed, the serum to be tested is diluted with plasma or serum. The test is performed as follows: Two drops of a 2 per cent suspension of group O, Rh positive cells in compatible plasma or serum are placed in a small test tube. Two drops of the serum to be tested are added. After shaking the tube is placed in a water bath at 37°C. for one hour. The appearance of the cell deposit is noted. A smooth outline is characteristic of the negative result. In positive cases the outline is irregular and

crenated in appearance. The tube is very gently shaken and agglutination looked for with the naked eye or with the aid of a hand lens. If there is no clumping, one drop of the mixture is examined under the microscope for confirmation of the absence of agglutination. The result is controlled by testing with a Rh negative blood.

The capillary tube test.—It is a very simple and rapid test requiring a minimum of equipment and reagents. Capillary tubes of 0.4 mm. bore and 8 cm. in length are sterilized in a test tube. One end of the capillary tube is dipped into the serum to be tested and a column about 2 cm. in height is allowed to run in. The tube is next dipped into fresh group O, oxalated or citrated blood and an equal column of blood drawn in, care being taken to prevent air bubbles getting in between the serum and blood. The tube is tilted up and down 2 or 3 times to mix the blood and serum. The blood end is then inserted into a plasticine rack at an angle of 45° to the horizontal, but the flatter the better. After incubation for 15 minutes at 37°C. the result is read against a white background. If positive, a beaded layer of cells is formed along the lower side of the capillary tube. A negative test, on the other hand, forms a long, thin smooth line.

Samples of blood from the father, five-year-old child, the mother and her seventeen-year-old brother were collected in dry sterile tubes and in oxalate. They were grouped according to the ABO system. The father's blood belonged to group B, while that of the others belonged to group O.

Tests for Rh sensitization

(a) *Diamond-Abelson test.*—In the absence of known Rh positive cells the sensitivity of the mother's serum was tested against twelve different bloods of group O chosen at random (including that of the child and the brother) under the presumption that most, if not all of them, would be Rh positive. For the negative control, the mother's own cells were employed. The mother's serum agglutinated 11 out of 12 group O cells it was tested against, the brother's blood alone being negative.

(b) For the conglutination test the writer's serum (group AB) was used as the diluent. The test was positive with all the 11 bloods which were found positive by the Diamond-Abelson test. Thus there was complete parallelism between the two tests.

The capillary tube test was not performed. Table I shows the results of tests for Rh sensitization.

The two tests thus revealed that the mother (group O) possessed in her serum an 'atypical agglutinin' capable of agglutinating most other bloods of group O. That it was not a 'cold' or 'auto-agglutinin' was shown by the failure of the serum to agglutinate its own cells and those of the brother. The titre of the antibody was next ascertained by titration against cells of

TABLE I

Results of tests for Rh sensitization

Test blood number	Diamond-Abelson test	Conglutination test	
1	+	+	From child.
2	+	+	
3	+	+	
4	+	+	
5	+	+	
6	+	+	From brother.
7	+	+	
8	—	—	
9	+	+	
10	+	+	
11	+	+	Mother's blood.
12	+	+	
Control	—	—	

+ indicates the presence of agglutination.
 — indicates the absence of agglutination.

group O from two different persons (nos. 1 and 2) whose cells had been previously found to be sensitive to the serum. Saline solution was used as the diluent. The titre of the antibody in each case was 32.

It now remained to identify the nature of the sensitizing antigen. A supply of anti-Rh₀ serum was luckily available from the King Institute of Preventive Medicine, Guindy, Madras, and from the Army Transfusion Centre, Poona. Parallel tests were put up using the two different anti-sera and identical results were obtained. The father and child were Rh positive while the mother and her brother were Rh negative. All the other group O test cells were Rh positive. The antibody in the mother's serum reacted specifically against Rh positive cells and was therefore anti-Rh antibody. Further investigation to determine the specificity of the mother's serum is in progress.

Discussion

It is generally believed that anti-Rh serum is indispensable for investigation of suspected cases of Erythroblastosis foetalis. The fact that the mother is Rh negative while the father and child are Rh positive could be a mere coincidence. It is, on the other hand, more important to demonstrate the presence of the immune antibody in the mother's blood and its specificity to the child's cells. Anti-Rh sera are, however, necessary for determining the nature of the sensitizing antigen. With the help of the tests reviewed above it is possible for the clinician not only to make a presumptive diagnosis of iso-immunization, but he can apply the same tests as compatibility tests for selecting compatible donor for transfusion of the mother or infant. In the present case, it will be seen that the brother's blood alone is compatible. The tests

are very simple and can be performed in any well-equipped hospital laboratory.

The case reported is a typical one of iso-immunization against the Rh factor and satisfies all the criteria necessary for a diagnosis, *viz*, Rh hetero-specificity of mother and child and the presence in the mother's serum of immune agglutinins specific for the child's cells. It may be questioned how the first child, though Rh positive, escaped being affected by Erythroblastosis. It is well known that the first child generally escapes the affection as the mother is not sufficiently sensitized during the first pregnancy to cause the disease in the child. Though the first living child in this family was born of the third pregnancy, the first two pregnancies had each ended in abortion in the third month and had therefore not advanced far enough to bring about sufficient sensitization of the mother. It follows that the cause of the first two abortions and even of the third must be due to some other factor.

As regards the prognosis of future births, it may be predicted that all the children would probably be Rh positive and so develop the disease in an increasingly severe form. The reasons are: (1) the first child is Rh positive and the last three babies, born apparently well, each developed what looks like Erythroblastosis foetalis and died of it within a few days. They must therefore have all been Rh positive. (2) The father is probably of the genotype RhRh (homozygous) and so all future babies would be Rh positive. (3) Four months after the birth of the last baby the mother's serum contains immune Rh antibodies in a fairly high titre and future pregnancies will result in further immunization with increase in the concentration of the antibodies in her blood. It may, however, be possible to save the baby by timely blood transfusions with group O, Rh negative blood.

Summary

1. A typical case of iso-immunization against the Rh factor—apparently rare in India—is recorded.

2. Tests for Rh sensitization not involving the use of anti-Rh serum are reviewed and suggested for preliminary investigation.

3. It is suggested that congenital hæmolytic disease (Erythroblastosis foetalis) is probably not so rare in India as it is supposed to be.

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A Mirror of Hospital Practice

CEREBRAL MALARIA IN PREGNANCY SIMULATING ACUTE YELLOW ATROPHY OF THE LIVER

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A HINDU patient, age 40 years, 8th para, was admitted on 4th September, 1946, at 6 a.m., with a history of 8 months' amenorrhœa, vomiting, headache, labour pains and draining for the past 5 days.

History of previous deliveries.—All full term—natural. The first child died at 2 months—the rest are alive. Date of birth of last child 2 years ago.

Condition on admission.—Patient deeply jaundiced, drowsy and restless. Puffiness of hands, face and feet. Rash pale pink, fine and slightly raised on face and neck. Pupils normal—reaction sluggish—no photophobia. No hæmorrhages. Tongue coated, dry, tremulous and deep yellow. Abdomen—liver $1\frac{1}{2}$ inches and spleen 1 inch below costal margin. Circulating system—heart normal—pulse 98, volume fair. Blood pressure 90/60. Temperature normal. Respiratory system—dyspnoea—stertorous breathing. Urine—diminished in quantity, reaction acid, specific gravity 1.020, highly coloured, albumen 2 plus, sugar 1 plus, bile salts and pigments 2 plus. Numerous casts, granular casts predominating, red cells 3 plus, tyrosin crystals present. Height of uterus—32 weeks, not acting. Position of foetus—R.O.A. Fœtal heart not audible. Relation of head to pelvis—floating. Vaginal examination—Os $2\frac{1}{5}$ ths dilated. Cervix soft. Presenting part high up. Membranes bulging. Offensive discharge present.

Patient vomited a round worm soon after admission.

Treatment.—Soap and water enema given with good result—deep yellow motion.

11 a.m. Membranes artificially ruptured. 20 c.c. of $12\frac{1}{2}$ per cent glucose given intravenously. Glucose and sodium bicarbonate given by mouth frequently.

2 p.m. Pains commenced.

3.15 p.m. Birth of a dead female child which was also jaundiced.

3.30 p.m. Placenta expressed—placenta and membranes entire. Patient continued to be restless.

10 p.m. Patient became boisterous. Morphia gr. $\frac{1}{4}$ given.

5th September, 1946. Patient slept fairly well during the night. Passed a motion in bed—deep yellow in colour and very offensive. Patient comatose, and restless again.

12 midday. Pulse 140, feeble. Temperature (rectal) 106°F .

2 p.m. Patient expired.

Pathological Findings

Liver.—The general structure of the liver has been preserved. Liver cells show no evidence of cloudy swelling or degeneration, and the nuclei are well preserved. The sinusoids are dilated somewhat but are not congested. The Kupffer's cells contain small dark granules suggestive of a malarial infection.

Kidney: Macroscopic.—Capsule stripped easily, leaving a smooth congested surface. Demarcation between cortex and medulla good.

Microscopically the kidney shows widespread congestion and masses of the same dark pigment seen in the liver. This pigment is present in the mononuclears of the blood stream, in the glomeruli and between the tubules. The pigment resembles that seen in malaria.

Comment

The pathological findings suggest malarial infection, but at the time of admission diagnosis was difficult because of—

(a) Inability to obtain a correct history of the present illness—such as the exact onset of the illness, early signs and symptoms, frequency and nature of vomiting, presence of epigastric pain, giddiness, and mental disturbances. The relatives were unable to give any information concerning the patient's illness, and the patient was too ill to give further information concerning herself.

(b) Lack of information concerning previous malarial infection, or any other illnesses.

As this district is not an endemic area for malaria, malaria was not suspected.

Because of the serious condition of the patient on admission, the short duration of the illness, intense jaundice and the urinary findings, acute, yellow atrophy was suspected.

This case shows that cerebral malaria can simulate one of the toxæmias of pregnancy, and that a routine examination of blood smear for

malarial parasites and differential count is highly desirable in every pregnant woman in the tropics.

TOXIC SYMPTOMS ASSOCIATED WITH QUINACRINE TREATMENT

By D. K. NANDI, L.M.P.

Toxic symptoms such as restlessness, staring at others, incoherent talks, shouting all day and night, etc., were observed in 16 cases of malaria patients out of 450 treated with quinacrine. The average dose in all the cases did not exceed 2.8 gm. in one course of treatment. Majority of the cases referred above developed symptoms on the 3rd to 4th day of quinacrine administration. The aetiological factors responsible for such symptoms may be due to either individual susceptibility to the drug or specific toxic effect on brain tissue. Intravenous administration was not taken up in a single case as there was no such arrangement in the clinic. Large quantities of water were administered after each dose of quinacrine and the patients were allowed to go to their respective homes with advice to take more fluids whenever possible.

Treatment consisted of administration of hypnotics and large doses of vitamin B-complex (T.C.F.) orally and intramuscularly where oral administration was not possible. Large quantities of fluids also were administered for elimination of the drug from the system. In all the 16 cases mentioned, toxic symptoms disappeared in 3 to 5 days' time.

Comment.—Administration of vitamin B-complex in course of quinacrine or mepacrine treatment of malaria will probably lessen the occurrence of toxic symptoms.

A CASE OF RENAL GLYCOSURIA ASSOCIATED WITH HYPOVITAMINOSIS C.

By SACHCHIDANANDA BANERJEE, M.B.,
D.Sc. (Cal.), M.A.D.A. (U.S.A.)

Dr. A. Mitra Research Scholar in Diabetes, School of Tropical Medicine, Calcutta

This type of cases is not very common and an error in diagnosis might expose the patient to unnecessary and even harmful treatments.

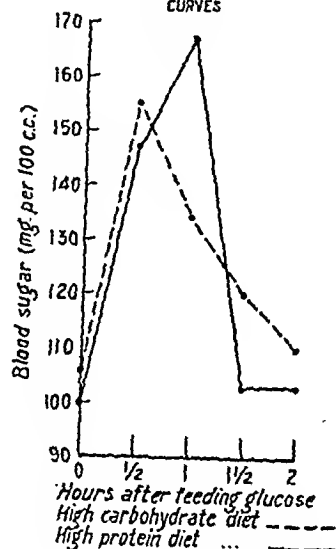
A 38-year-old Bengalee Mohammedan male, a tailor, was admitted into the Carmichael Hospital for Tropical Diseases on 16th January, 1947, for the following complaints: (1) weakness, (2) frequency of micturition and (3) passage of sugar in urine. Duration of all the complaints was only two months.

The patient said that his father died of diabetes. Routine tests revealed only the presence of sugar in the urine and no other abnormality was found.

After admission the patient was fed a diet consisting of protein, 130 gm., fat, 90 gm., and carbohydrate, 200 gm., which gave him approximately 2,000 calories. Urine was collected for twenty-four hours. On an average the

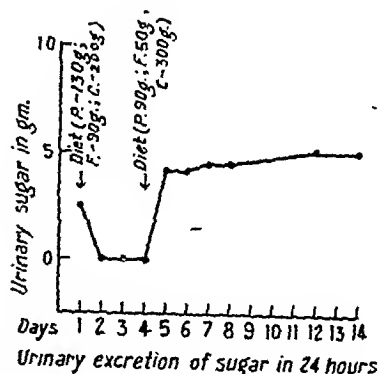
patient passed 1,700 c.c. of urine. Urinary sugar was estimated daily. On the fourth day of his stay in the hospital he was fed 50 gm. glucose in a 50 per cent solution and the glucose tolerance test was performed. The patient excreted no sugar in his urine when he was fed glucose, showed a normal fasting blood sugar value and the glucose tolerance curve was also normal (figure 1). Although the blood sugar level did not rise above 167 mg. per 100 c.c. blood, the patient excreted sugar at the end of the test. This indicated that the patient had a low renal threshold for glucose. The patient was then fed for ten days a high carbohydrate diet consisting of protein, 90 gm., fat, 50 gm., and carbohydrate, 300 gm. This diet also furnished 2,000 calories approximately. Glucose tolerance

FIG. 1.
GLUCOSE TOLERANCE
CURVES



test was again performed and it was found to be normal (figure I). The urinary excretion of sugar which was estimated daily showed that the patient never excreted more than 5 gm. of sugar per day (figure II).

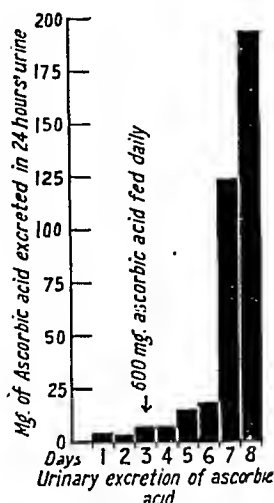
FIG II



The vitamin C nutrition of the patient was also studied by estimating the urinary excretion of the vitamin both before and after feeding the patient with a daily dose of 600 mg. of synthetic ascorbic acid (70 mg. per kilo). The

results are shown in figure III. Before ascorbic acid was fed the patient excreted on the average 5 mg. of vitamin C in 24 hours which was very low. After the ascorbic acid was fed there was no marked increase in the urinary excretion of the vitamin even three days after its administration. In normal individuals, however, a high

Fig. III.



rise in the urinary excretion of the vitamin is obtained only one day after the administration of the test dose of ascorbic acid. This indicated that the patient was suffering from hypovitaminosis C. The patient, however, did not show any sign of marked vitamin C deficiency as evidenced by bleeding gums, petechia, ecchymosis, anaemia, etc.

When the patient was discharged although he was excreting 5 gm. of glucose daily his weakness and frequency of micturition had disappeared. The complaints of the patient therefore seem to be due to hypovitaminosis C and not due to renal glycosuria because the latter condition is usually without any symptoms and is only revealed after accidental examination of the urine for sugar.

I am indebted to Messrs. The British Drug Houses Ltd., Bombay, for a free gift of ascorbic acid.

A CASE OF CRANIOCLEIDODYSOSTOSIS

By R. DWIVEDI

M.O. Machhalishahr, Jaunpur, U. P.

A MUSLIM boy of 15 years came in September 1946 for a sinus under his chin of 3 years' duration. He had a carious molar tooth in the lower row, which was responsible for the sinus. The sinus was scraped and the tooth removed. This resulted in closure of sinus within a few days.

While he was under treatment for the sinus, it was accidentally revealed that he had no fully developed clavicles and that shoulders could be apposed to each other in front.

Further examination revealed that each clavicle was imperfectly developed, consisted of

two pieces with a central one inch gap, with thin cartilage-like structure. Shoulder joints were rather prominent and narrow from side to side. Infraspinatus on each side was poorly developed with hollow infraspinous fossa. There were depressions and bosses over the skull.

The boy on the whole was of poor development, but had never suffered from rickets and all other bones were normal. He has been carrying on with his usual work of an agriculturist class to which he belongs.

This is a case of 'Cranioleidodysostosis', which is described as 'a very rare abnormality, which is hereditary and familial. The bones affected are those which are developed from membrane'.

I wish to thank Captain B. B. Das, Civil Surgeon, Jaunpur, for permission to publish the case report.

MEPACRINE PSYCHOSIS

By M. S. H. MODY, M.B., M.R.C.S., etc.

THE following description of a case, of the above condition, seen in consultation with his doctor, may prove of some interest to your readers.

K., Hindu, pleader, aged 42, developed fever on 8th November, 1946. For the first two days he was treated symptomatically, but as during these days the fever was intermittent, his doctor started him on mepacrine tablets from the evening of 10th November, 1946, the dose being 3 tablets per diem, in addition to the plain diaphoretic mixture. An injection of 6 grains of quinine was given on the 12th November, 1946 (blood was not examined for M.P.).

By evening of the 13th November, 1946, by which time he had taken 12 tablets of mepacrine, he became very talkative, excitable, and inclined to be rather noisy and boisterous. This was most unusual, as the patient was of a very quiet, reticent and calm disposition. The doctor, attributing this change in his disposition to mepacrine, discontinued the tablets, and treated him by sedatives, which quietened his boisterousness, but he continued to be very talkative, and at times was incoherent, his replies being confused and not rational.

By the 18th November, 1946, viz, five days after mepacrine was stopped, he again became very violent, boisterous and abusive, threw away all his clothes, got out of his bed, and assaulted his relatives. When forcibly kept in bed, he continued to shout, sing and talk to himself. These symptoms continued till the 20th November, when I saw him. All these days from the 13th to 20th November, 1946; he was running a low temperature between 99° and 101.5°. Clinical examination revealed no neurological lesion nor any evidence of meningitis or encephalitis, as these were by now suspected as the cause of his mental state.

Urine and blood film examinations now done proved normal. The latter showed no M.P.

I suggested an immediate injection of Dial (Ciba) and to be repeated at bedtime with a bromide and chloral hydras mixture.

The first injection made him sleep for about 5 hours, the first time in three days.

Next day he was much quiet, and he recognized people round about him, yet there remained a fair degree of confusion and disorientation in his ideas and talk, which gradually cleared up.

From then onwards he improved and made an uneventful recovery.

Summary

In a case mental confusion and euphoria commenced after 12 tablets of mepacrine, viz, on the fourth day after commencing to take them, gradually progressing into a violent maniacal condition although mepacrine was discontinued. This acute psychosis was at its worst on the eleventh day after taking mepacrine and seven days after the drug was discontinued.

The case must be regarded as one of mepacrine psychosis.

A CASE OF PRIMARY PNEUMONIC PLAGUE

By THAN AUNG, M.B., B.S. (Rangoon), T.D.D. (Wales)

A BURMESE female, age 28, was admitted into the isolation ward of the Civil Affairs Service Hospital, Nyaunglebin, on the morning of 16th January, 1946, suffering from fever and a slight cough of 5 days' duration. Her husband had died three days previously after suffering from fever for 7 days. There was a suspicion that her husband had died of a respiratory infection as he was alleged to have expectorated blood-stained sputum during the course of his illness. He was not admitted into hospital. On admission she had no apparent dyspnoea or cyanosis, and had walked into hospital. There was no toxæmia, the only symptoms that she complained of were a slight cough, and a feeling of tightness in the chest.

Clinical examination.—Eyes—bright, no congestion. Tongue—betel-stained. Heart—first sound partially replaced by a soft mitral systolic bruit. Lungs—no dullness on percussion. Right base full of crepitations. Sputum—rusty. Spleen—soft and palpable. Liver—not palpable.

Laboratory examinations.—Blood—no malarial parasites seen. Total W.B.Cs. 12,200 per c.mm. with polymorphs. 83 per cent and lymphocytes 17 per cent. Sputum—character rusty. The specimen was sent to a M. F. T. U. at Pegu, 50 miles away. Report—*Pasteurella pestis* present. No culture or guinea-pig inoculation was done.

Treatment.—Before waiting for the laboratory diagnosis the patient was put immediately on admission on the following treatment:—

1. Sulphathiazole 4 tablets *statim*, 4 tablets next dose, and 3 tablets 4 hourly thereafter.
2. Leptazole, 1 ampoule 4 hourly.
3. An alkaline mixture with grs. 60 each of sodium bicarbonate and citrate, and m 20 of liq. ammon. aromaticus per ounce 4 hourly.
4. Fluids *ad lib*.

The patient's temperature began to come down within 24 hours reaching normal 48 hours after admission, and thereafter assumed an irregular curve for a further 13 days. There was continuous improvement of the patient's general condition despite the temperature. Sulphathiazole was continued for 9 days. A total dose of 63½ gm. was given. A check up white cell count was made. Total W.B.C. count was 9,500 per c.mm. Differential count: polymorphs 65 per cent, lymphos. 30 per cent, eosinos. 3 per cent, myelocytes 2 per cent. During the course of the treatment, on 20th January, 1946, the patient's output of urine became reduced, and 2 pints of glucose saline were given intravenously by the drip method. There were no further complaints. The sulphathiazole was stopped as the total dose already given was rather excessive, and there was a suspicion that the continued temperature may have been caused by the drug. Treatment was then switched on to penicillin, 10,000 units intramuscularly every three hours, a total of 360,000 units being given. The temperature then came down gradually till it reached normal 13 days after admission.

A small blood transfusion (200 c.c.) was given on 28th January, 1946. Except for suppression of urine 12 hours after the transfusion which responded to an injection of ½ c.c. of adrenalin, there was no other untoward reaction.

Physical signs in the chest as indicated by a daily examination of the right base began to disappear with the sulphathiazole therapy. This improvement however was not sustained for with the return of the temperature the crepitations returned, and persisted till 5th February, 1946, when no physical signs could be detected.

Sputum.—After the diagnosis was established, the sputum was not examined till 2nd February, 1946, onwards when a daily direct smear revealed cocco-bacilli with bi-polar staining, till 5th March, 1946, when no such organisms were detected. The patient was discharged when 3 negative results were obtained. An attempt was made to determine whether the cocco-bacilli seen through the microscope was *Pasteurella pestis* or a normal inhabitant of the upper respiratory passages, as the stain used was a 1 to 10 dilution of carbol-fuchsin, and differentiation was rather difficult. Unfortunately the specimen sent for culture and if necessary animal inoculation did not reach the laboratory which was in Rangoon 100 miles away.

The unusual features of this case are:—

1. The absence of any toxicity throughout the entire illness, in spite of the fact that the

condition is notoriously dangerous, and death usually occurs within a few days of the onset. The patient came into hospital on the 5th day of her illness, and on a cursory examination there was nothing to suggest that it was a case of pneumonic plague.

2. The low grade of infectivity in this case when this condition is one of the most infectious of all acute contagious fevers. The two relatives of hers, apart from being inoculated with Haffkine's anti-plague vaccine, did not observe even the most elementary precautions while they were nursing her. Both of them are still alive and well.

3. The large amount of sulphathiazole that was administered with little or no toxic symptoms, except a slight diminution in the urinary output, which responded to intravenous glucose saline, a total dose of 63½ gm. being given spread out over 9 days.

4. The record of her temperature revealed a secondary rise which continued for 4 days after the drug was stopped, and 4 days after the institution of penicillin therapy. Whether the temperature was due to the sulpha drug, the so-called 'drug fever', or whether penicillin exerted its effect on the infection I cannot say, but the patient's temperature remained normal till her discharge.

5. The blood transfusion was given on the rationale that a fresh supply of leucocytes would help in overcoming the infection.

6. The presence of cocco-bacillary organisms in the sputum long after she had clinically recovered from the infection makes the condition rather interesting. Unfortunately, it was impossible to determine whether the organisms seen were *Pasteurella pestis* or not. Their persistence in the sputum, if they were really plague bacilli, in conjunction with the fact that pneumonic plague is a rarity in Burma where bubonic plague is endemic, and that explosive outbreaks of primary pneumonic plague occur, claiming a number of victims and then subsiding would appear to suggest a carrier condition as in cerebro-spinal fever.

Therapeutic Notes

NOTES ON SOME REMEDIES

IX. AMŒBICIDES

II

By R. N. CHAUDHURI, M.B. (Cal.), M.R.C.P. (Edin.),
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General principles of treatment

THERE is still an impression that the treatment of intestinal amœbiasis consists in simply giving a course of emetine injections which can be repeated periodically if the symptoms persist. This probably arose from the fact that,

as with all new methods of treatment, early reports on emetine were unduly optimistic. The immediate effects of injections on the acute stage of amœbic dysentery, with active forms of *E. histolytica* in the faeces, are undoubtedly dramatic, but clinical cure and permanent freedom from infection are by no means always synonymous. As long ago as 1917, Dobell found that full courses of emetine hydrochloride given hypodermically were successful in about a third of the cases treated (nowadays perhaps this would be put at a still lower figure), but unfortunately his pioneer work seems to have escaped the notice of many clinicians. So unless the patient's resistance is very good, emetine needs supplementing with other drugs. To go on giving it when it fails initially is not only useless but hinders subsequent radical treatment.

In considering the therapeutic problem it is necessary to remember that the active vegetative amœbæ after gaining entrance in the tissues of the large bowel multiply and form small abscesses in the submucosa which burst and become ulcers. These ulcers extend peripherally and deep into the submucosa. After a time some of the amœbæ pass into the lumen of the bowel and assume cystic forms after passing through a precystic stage. These precystic and cystic forms are not found in the tissues but congregate on the mucous surface of the bowel where they lie embedded in the mucus. The mature cysts eventually leave the body with the faeces, but the important point is that emetine given hypodermically has not much chance to act on the amœbæ and cysts lying within the bowel. To extirpate them the drug must be introduced directly into the alimentary tract, and emetine-bismuth-iodide was the first drug elaborated to achieve this local action. But even oral medication is not always enough. Amœbic ulcers may be scattered about anywhere between the cæcum and rectum, and those situated lower down in the canal are not so well acted upon by drugs given by the mouth. Hence it has been long customary to give rectal injection of eusol or silver nitrate solution especially in chronic cases in which the rectum and the sigmoid are invariably involved, but chiniofon is the best for this purpose.

There is another important factor which often militates against radical cure and that is the secondary infection of the ulcers with pyogenic organisms. Nearly 20 years ago Acton and Knowles (1928) stressed the importance of streptococci in resistant cases and commented that the whole bacterial flora appeared quite changed from the normal. This secondary infection together with the fibrotic changes in the ulcers may well prevent emetine from exerting its effect on the *E. histolytica*. Indeed there are clinicians who attribute the so-called emetine-resistance to this cause only, and it is highly probable that many of the toxic and emaciated cases are not so much due to the

virulence of the amoebae as to the widespread secondary bowel infection. In several chronic resistant cases preliminary treatment with penicillin and sulphasuxidine has been given with very encouraging results; it has made them more amenable to treatment with drugs which have a specific action on the amoebae.

The position, therefore, is that no single drug will eradicate more than a certain proportion of infections. Emetine hydrochloride is the only known satisfactory drug in the treatment of amoebic hepatitis and amoebic liver abscess. Its efficiency in amoebiasis of the intestine is limited to the control of acute symptoms, but there is too often a tendency to repeat the procedure unduly. Repeated experiences have shown that the vast majority of cases are thereby rendered less amenable to treatment with other available drugs. Of these the most commonly used are emetine-bismuth-iodide, carbarsone, vioform and diodoquin by mouth and chiniofon by rectum. The usual procedure is to give a combination of two or more of these drugs with or after preliminary use of emetine in an endeavour to obtain sterilization. Opinions differ as to the best combination, but the prospects of radical cure are quite good although there is room for improvement and a search for more effective remedies is very desirable.

Acute amoebic dysentery

The patient should be confined to bed and put on a suitable diet. The treatment is initiated with a course of daily injections of emetine hydrochloride in $\frac{1}{2}$ to 1 grain dose given in the way previously indicated. Along with emetine carbarsone is given by mouth in dosage of 0.25 gm. (in capsule) twice daily for 10 days. The response in the majority of primary cases is evident within 48 hours, and the diarrhoea ceases in 4 or 5 days. After two or three weeks the stools should be examined and, if possible, also the material obtained by sigmoidoscopy or proctoscopy. Cysts or the vegetative forms of *E. histolytica* seldom reappear in the faeces until 10 to 20 days after treatment and negative stools in the first 10 days are not reliable as regards eventual cure. If negative, this examination is repeated two or three times or more for the passage of amoebae in the faeces is often intermittent. Actually the above treatment does not cure the infection in a proportion of the cases, so it is advisable to give after ten days a further course of carbarsone or a course of diodoquin, 3 tablets (3.2 grains each), thrice daily for 20 days. This clears up most of them, but a few may still remain resistant to treatment though there is nearly always symptomatic improvement.

Relapses

These occur when the patient's power of resistance is poor or where treatment has been inadequate. Relapses tend to become more frequent and more resistant to treatment the longer

the infection has been present. Only a few injections of emetine are given, if necessary, to control acute symptoms but it is unlikely to do much good if the patient has already had prolonged courses. Manson-Bahr (1945) strongly recommends combined treatment with emetine-bismuth-iodide by mouth and chiniofon by rectum for 10 days, and indeed he is in favour of giving this treatment as a routine even in acute cases of dysentery after preliminary use of emetine. This was also the standard treatment in the British army during the last war. It has not become very popular in Indian civilian practice owing to its unpleasant nature, but it should not be difficult to adopt in hospitals. It is most necessary that these drugs should be used with meticulous attention to details which have already been given, otherwise the results will not be satisfactory. The treatment which can be repeated is completed with a course of carbarsone for 10 days.

Willmore (1945) claims to have obtained equally good results from the following treatment:—

On odd days: one 'slipule' of auremetine, 1 grain, three times daily to a total of 10 days.

On even days: tablet stovarsol, 0.25 gm., three times a day to a total of 7 days; chiniofon retention enema of one litre daily, the first two of 2½ per cent, the last eight of 4 per cent.

Mateer and others (1940) got 97 per cent of success by combining carbarsone with chiniofon enemas. The failures were later cured with vioform.

We need not mention similar other combinations that are preferred by different clinicians, but of late diodoquin is being increasingly used in the treatment of chronic cases. It is well tolerated in all but a small minority of cases and has sometimes caused effective and dramatic cures. In addition it has a good moral effect on patients who had previously had repeated courses of a depressing drug such as E.B.I. especially when they notice rapid clinical improvement following its use. Occasionally some of the chronic relapsing cases do not show much clinical improvement even after one or other of these standard treatments, but continue to pass stools mixed with pus, mucus and blood, probably owing to concomitant bacillary dysentery. Such cases are often benefited by a course of sulpho-namide treatment (*vide infra*).

Chronic amoebic dysentery

As a result of long continued infection by *E. histolytica* and bacteria the patient suffers persistent diarrhoea and his condition deteriorates in spite of treatment. He becomes cachectic and pyrexial with abdominal pain and tenderness, and sigmoidoscopy shows ulceration of the rectum. These cases show little or no response to standard treatment. Being impressed by the part which bacteria might play in preventing response to anti-amoebic treatment, Hargreaves (1945) has treated several such cases

successfully with penicillin and sulphasuxidine. The total dose of penicillin is about 2 million units, given in 30,000 unit doses intramuscularly every 3 hours. Concurrently a course of sulphasuxidine 20 gm. or phthalyl sulphathiazole 10 gm. daily is given for the same period. If necessary either of these drugs may be substituted by sulphaguanidine, sulphadiazine or sulphathiazole in appropriate dosage. After this preliminary course ordinary anti-amoebic drugs should be administered. The complete treatment which is summarized below is recommended for refractory cases who have ulceration which is visible with the sigmoidoscope, or clinical and radiographic evidence of localized disease such as local tenderness and thickening or induration with filling defect.

Day 1-8. Penicillin and sulphasuxidine in doses given above.

Day 9-20. E.B.I. each night and chiniofon retention enema each morning.

In lieu of E.B.I. and chiniofon enema a 20 days' course of diodoquin by mouth.

Day 21-30. Carbarsone for 10 days.

A certain number of the chronic cases pass gradually into a state of non-specific colitis, differing little from chronic bacillary dysentery or so-called ulcerative colitis. It is frequently difficult to demonstrate amœbæ in the stools. The condition is commonly accompanied by malnutrition and cachexia and sometimes associated with faulty absorption. These patients should receive hæmatinics and vitamins, especially B-complex, in addition to both anti-bacterial and anti-amoebic treatment. Medicated bowel washes (sulphaguanidine, silver nitrate, etc.) are usually necessary. The importance of general treatment must be emphasized. The chronic patients should be given as full a diet as possible, avoiding coarse vegetables, spices and alcohol. It is essential to have a cheerful atmosphere for too often they become bowel-conscious and develop anxiety symptoms.

Tests of cure

Two to three weeks after treatment is completed, three daily specimens of stools are examined and sigmoidoscopy is performed. It should be remembered that sigmoidoscopic findings may be positive when stools are negative and *vice versa*. Again after a month six further daily stools are examined and sigmoidoscopy is repeated. But such examinations are only possible under hospital conditions. An alternative is to follow up the clinical history of the patient for at least a year after treatment has been discontinued. Certain signs are valuable, though not infallible, guides to the presence of activity: mucus in the stools with or without blood, tenderness over the iliac fossa and palpable cæcum or colon.

Complications

In the absence of abscess formation, patients with hepatitis always respond quickly to

emetine. A full course should be given preferably combined with diodoquin to eradicate infection in the bowel. When abscess has formed, the recognized treatment is emetine plus aspiration repeated as considered necessary. When it is secondarily infected with bacteria, aspiration with chemotherapy appears to give far better results than open operation which has until recently been the common method of treatment in this condition, though associated with high mortality. Latterly we (Chaudhuri and Chakravarti, 1947, in press) treated successfully a case of liver abscess infected with anaerobic streptococci by repeated aspiration along with penicillin systemically as well as locally into the cavity. Aspiration was done on alternate days at first and later at intervals of several days, being guided by the rise of temperature and local tenderness, 50,000 units of penicillin being injected into the abscess cavity after each aspiration. During a period of five weeks he was aspirated ten times. Besides he was given penicillin injections, 20,000 units three hourly, for seven days. This method of treatment should be tried first before considering open drainage. *Amœbiasis of the lung* is not uncommon in this country although it is apt to remain undetected or perhaps wrongly diagnosed as pulmonary tuberculosis. Response to emetine is usually striking, but there may be aggravation of symptoms after the first few injections (Chaudhuri and Rai Chaudhuri, 1946). *Amœbic ulcers of the skin* that may follow opening of peri-rectal abscess or a colostomy wound clear up readily with emetine therapy.

Cyst-passer

Persons may pass *E. histolytica* cysts in their stools with or without previous history of amœbic dysentery. Though apparently healthy, they may develop acute intestinal symptoms or some other serious disease at any time. Though they pass cysts, the amœbæ are also present in the tissues. These cases are often satisfactorily treated with carbarsone alone or with emetine and diodoquin. Stools should be re-examined four to six weeks after treatment.

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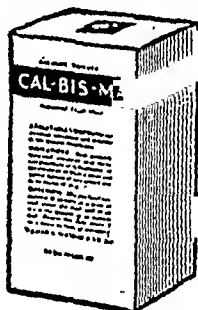
certain beef preparations. One of the substances investigated was Bovril.

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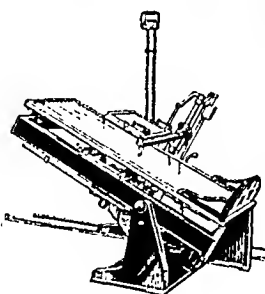
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Indian Medical Gazette

MAY

HOMO SAPIENS

THE proper study of mankind is man. Striking biological features.—The species possesses many such features. The first feature is the polytypicity (Cole, 1937; Burkitt, 1946). Well-defined types fully definable in terms of anatomy and also differentiated fully or partly by blood group distribution exist and have existed presumably ever since the species made its appearance on this planet. Such types are known in domestic animals also, an example being the dog. They have been created by man through selection. In man they seem to have appeared spontaneously by mutation and then been preserved by isolation and inbreeding. Language appears to have played an important rôle in bringing about the isolation and inbreeding.

Even in the sub-Homo and sub-sapiens species the polytypicity appears to have been striking. Amongst the sub-Homo species, the Peking man (*Sinanthropus*), the Java man (*Pithecanthropus erectus*), and the Piltdown man (*Eoanthropus*) and their contemporary in India (*Sivapithecus*) are alike and yet different. Amongst the sub-sapiens species, the Neanderthal man (*Homo neanderthalensis*), the Heidelberg man (*Homo* or *Palaeoanthropus heidelbergensis*) and Rhodesian man (*Homo rhodesiensis*) are again alike and yet different. Almost so are the various types of the *Homo sapiens* to-day. The sub-Homo species have disappeared. The sub-sapiens species may have survived, more or less mixed, in the negroid and australoid races of to-day.

(It will be noticed that the Heidelberg man has been regarded both as a *Homo* and as a sub-Homo species.)

The main Primate stem of life appears to have thrown out branches which became distinct and final very soon. The old world monkeys and the new world monkeys are two other examples. Did the races of the sub-Homo man disappear because of this distinctiveness and finality? A true human type, the Bokop man of South Africa, probably the ancestor of the living Bushmen, has also disappeared. Its cranial capacity was larger than that of the modern man (1,600 c.c.). The great reptiles of the Mesozoic era which in distinctiveness and finality attained perfection and dominated the planet also became extinct. The question of undue isolation and inbreeding, caused by a language, of course, does not arise in their case.

If some day it is decided that after all most of the so-called sub-Homo species were not only *Homo* but varieties of *Homo-sapiens* then the polytypicity becomes all the more remarkable.

Such a decision is not unlikely. Only Man (i) uses fire and (ii) chews his (cooked ?) food with a rotary motion (which leaves its evidence on the mandibular joint). The species at present regarded sub-Homo did both.

On the other hand even the Neanderthal man, *Homo neanderthalensis*, might not have been so near to *Homo sapiens*. He lived in Europe for 200,000 years and disappeared after the arrival of the latter as Cro-Magnon man. He was powerful, ugly, brutish, cunning and possibly cannibalistic and incapable of articulate speech. Between him and the newcomer no love was lost. The few surviving members of Neanderthal colonies, living in caves inaccessible to the newcomers, might well have been the legendary ogres of Europe (Wells, quoting H. Johnston's *Views and Reviews*). *Fe fi fo fum* would be their speech according to the English legend. The polytypicity of to-day becomes more remarkable still.

(The Indian homologues of the ogres would be the *Rakshashas* of the semi-mythical lore. They were also powerful, ugly, brutish and cunning but not incapable of articulate speech. One family with its capital in an island controlled part of Southern India. It was overthrown by the hero of the Ramayana.)

The second feature is the striking difference in modes of living which is based on ideology which in its turn is linked with the general racial type: The spiritualistic East, the materialistic West and the cannibalistic remnants of earlier races. The first type of *Homo sapiens* appeared about 40,000 years ago, probably in South East Asia (Dale, 1946) and the Cro-Magnon man of this stock took his tribe to Europe between 40,000 and 25,000 years ago (Wells, 1931) to start the Old Stone Age. How much of the spirituality of the East is the accumulated wisdom of the older group of humanity (the elders) in the East and how much simply an escape from the depression of frustration resulting from competition with the younger group of humanity (the youngsters) in the West, may not be easy to decide. Both factors certainly exist. The cannibalistic remnants of earlier groups, probably only partly *Homo sapiens*, are an anachronism. Their day really ended when the fight with the tropical heat and wild fauna of the jungle was decided in man's favour by his inventive psychology. Some of them carry lethal genes like the gene of sickle cell anaemia, a race specific disease (Editorial, 1947).

Incidentally, the emotion allied to spirituality, the idea of unqualified devotion and unconditional surrender to the powers-that-be, is not new in zoology. The dog has the same feeling towards man, next to the dog comes the horse and next to the horse comes the elephant.

The third feature is the supremacy over the planet. The Eastern races believe and the Western races know that the Earth is their heritage. This supremacy is not new. It was

also in the possession of the reptiles in their age. No other creature has yet thrived physically so much as did the reptiles. Yet they have disappeared leaving behind a few loathsome remnants.

Man's supremacy, however, is not undisputed. Insects are very important in the tropical region, the most fertile part of the globe. Here they interfere with man much more than he can interfere with them (Allee, 1937). In their social system too the insects may be superior to man. The life of the ant is suggestive of a single vital principle common to all the members of a nest, in spite of different bodies (Maeterlinek, 1941), the *group soul* of a certain system of theology. In an emergency every ant *knows at once* what to do, without receiving any orders from any source. Human civic sense has not yet come anywhere near such perfection.

The *fourth* feature is the instability of the brain. Insanity is found in *Homo sapiens* only and has become a serious problem (Curran and Guttman, 1939). Here again probably the finality in development is the cause. Smaller upsets like hysteria are also found in the dog which again is a creature specially gifted with emotion and devotion.

Here an attractive though speculative hypothesis may be advanced: Man is unstable because he is not a mature animal really. He is an ape's foetus which has continued growth foetus-wise, assumed a respectable size and even started reproducing, neoteny. Man is a foetalized ape (Dale, *loc. cit.*). Other examples of foetalization are known in zoology: (1) Female glow worm has the structure of a beetle larva. (2) Axolotl can be turned into *Amblystoma* by injection of thyroid extract. The former although sexually mature retains the larval form of a newt in possessing gills. The latter has no gills.

The same fault in man's make-up might be held responsible for cancer in man: The essentially foetal tissue runs amok at times.

The *fifth* feature is the sense of comfort and leisure of which are born art and equity. While other animals live and move stimulated by hunger and love only, man aims at comfort and leisure also. The comfort is more than that of the body alone. While an animal elings to life at any cost a man suffering from bodily or mental discomfort often commits suicide. When he suffers acutely for reasons of sentiments he kills himself to save his honour and also sacrifices himself as a martyr or a patriot. The tales by some naturalists of scorpions committing suicide, if not discredited, show an instinct which finds full expression in man only.

Although sports are enjoyed by animals also and are the commencement of leisure in zoology, real leisure and art, like insanity, appear to be the monopoly of man only. Even the early cave dwellers decorated the walls and roofs of their caves by drawing on them pictures of life around them.

Equity appears to be the essence of human sapience. Arising from the social instincts well recognized in zoology, man's equity may be taken as a measure of human civilization and progress. It provides the only reliable evidence for judging between different races, ages and cultures of humanity.

Other measures like invention, production, comfort, art and longevity have been suggested. Yet the culture, the race or the individual excelling in fairmindedness and justice gains the leadership of the intelligentsia of the entire world, in spite of difficulties of language, time and space.

Wars and rumours of wars, and health of man.—Is war to a man what maternity is to a woman? It might have been so when it did not spread to the entire planet. But with the present trend towards perfection of lethal implements and our physicists being quite capable of blowing the planet to pieces in a day, war would be to man, what puerperal septicaemia in the pre-sulpha drug days and pre-antibiotics days was to a woman. Should the settlement of human quarrels be left to the economists (and their subservient defence services) or should social health be counted upon to create such a healthy, happy and contented world that wars and rumours of wars will not find a place in it? The latter proposition falls well within the scope of medical men. Health may supply what so far only force of arms has procured. Of health is born the joy of living; of the joy is born strength; of the strength are born the will to work, invention, production, and all necessities and amenities of life. An aggressor takes the necessities and the amenities from others by force of arms: so taken they do not last long. Nature makes the serf take his revenge. By waiting on his master hand and foot and becoming a 'yes man' he saps his virility, damages his equity and integrity, and reduces him to serfdom also, when another aggressor attacks in due course.

Besides, the messenger of health is always listened to and is able to teach what is wanted for social reform. Who should know better than a family physician the worries of a family which is the foundation of the society and of the State? It is worth knowing that all spiritual teachers of the world found their followers through miracles of healing. Let not the medical men miss opportunities. Social reform is needed in Asia generally and in India particularly.

Further, a healthy, happy and contented nation would soon teach an arrogant and aggressive neighbour that the tales of racial superiority and inferiority are myths. 'Man is a man for a' that'. In Asia he possesses his due share of mineral wealth and more than due share of earth's fertility.

Man's importance in biology.—Life on this planet would go on as usual if all men were to die overnight. On the other hand, life would not be

possible for more than a month or so if the colour bearing vegetation, responsible for photosynthesis, and the humble fungi, responsible for returning to the earth and atmosphere the dead animals and plants, were wiped out as suddenly. The photosynthesis makes food without which animals cannot live. The continuous accumulation of dead animals and plants would take up so much of land and sea that the living animals and plants would not be able to find a place anywhere. Whatever be the opinion of man on his own greatness, in the matter of large-scale protoplasmic transactions, he is like all other animals inferior to plants.

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Special Article

HISTORY OF KALA-AZAR IN INDIA*

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Introduction.—Kala-azar or the black fever was so named because in a large proportion of chronic cases there is a well-marked dark pigmentation of the skin. The word 'kala' may also have been used as signifying 'fatal' or 'deadly', because of the fact that the disease was fatal in almost all cases.

Early history.—Kala-azar is believed to have existed in Bengal for over a century now. Twining writing in 1835 described a condition

that he called 'endemic cachexia of the tropical countries that are subject to paludal exhalations'. The disease he described under this title was certainly kala-azar so closely does the description fit in with the classical picture of kala-azar. It was in 1824-25, that there was an outbreak in Jessore of a fever that was characterized by relapses, progressive emaciation and enlargement of the spleen and the liver and the occurrence of certain complications that are frequently seen or almost exclusively occur in kala-azar. This outbreak led to an appalling mortality and no less than 75,000 people died in the division. From Jessore this disease spread to Nadia in 1832 as well as to the 24-Parganahs. It reached the Hooghly district in 1857 and in 1862 it reached the Burdwan district from the contiguous Nadia and the Hooghly districts. The disease reached Burdwan town in 1866. The description by Dr. French, the civil surgeon of Burdwan, of this fever may even to-day be regarded as an excellent clinical description of kala-azar. He traced the course of the progress of the disease from the time of the Jessore epidemic to the time of the Burdwan epidemic of the sixties of the last century.

The disease was introduced into the Daeca district in 1862 by the crew of a country boat who came from upcountry to the inland port of Jageer on the Dhaleswari river. All these men died of a low remittent fever of long duration. The disease spread to this town and thence to the village and towns of the district. In four years the once populous town of Jageer had ceased to exist. The mortality was so great that the dead were left in their houses or thrown into the 'beels' or rivers. There was an epidemic of this disease in North Bengal in 1872. In Bihar it was known to have existed in 1882 and there it was called 'kaladukh'.

The spread of the disease to Assam followed in the wake of the British conquest and the opening up of communications by road and steamer services with Bengal. The first outbreak was reported in 1875 from the Garo hills, where the local population called it 'sarkari hemari' or the British Government disease. Rogers was of the opinion that the Garo hill epidemic was caused by the direct extension of the disease from the Rangpur outbreak of 1872, the route being the newly opened trunk roads along the Brahmaputra river. The map (map 2, after Rogers) shows the spread of the disease into Assam during the last quarter of the last century. Kala-azar caused terrific havoc in Assam during the period; of the people affected over 95 per cent died and this led to a serious decimation of the population, over 25 per cent of the population dying in some districts.

That kala-azar was prevalent in other parts of India, viz, the Madras Presidency and the United Provinces, was recognized after the discovery of the parasite in 1903 (see map 1).

Previous to the discovery of the parasite, several hypotheses were put forward by different

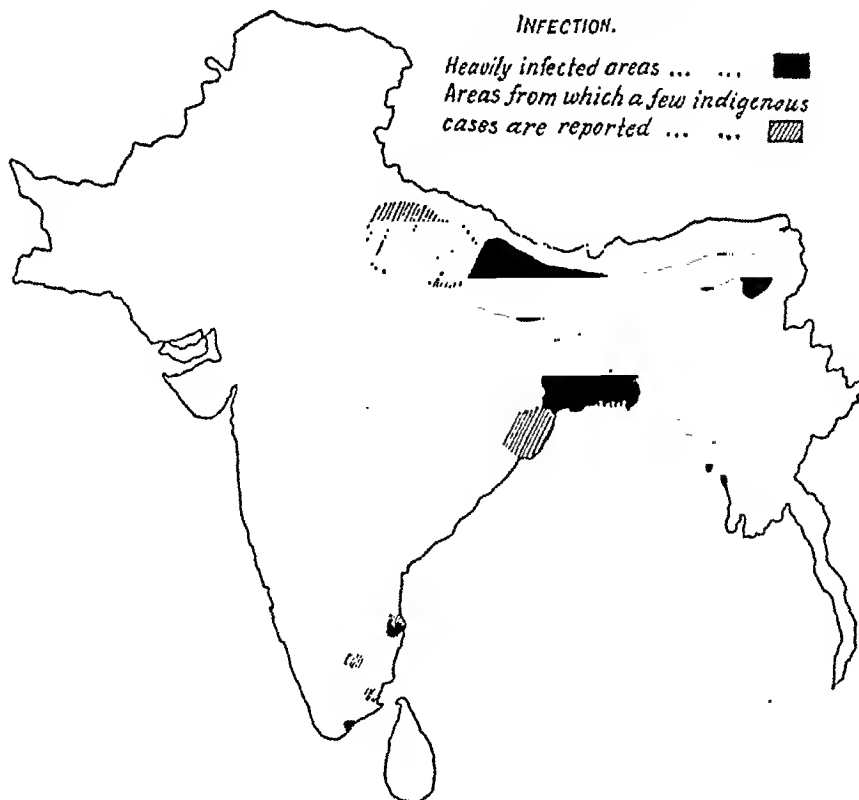
*Sir U. N. Brahmachari Memorial Lecture, Royal Asiatic Society of Bengal.

workers. Some interesting examples of the dangers of partial correlation were displayed when Giles (1892) finding the hookworm ova in the stools of every case affirmed the disease

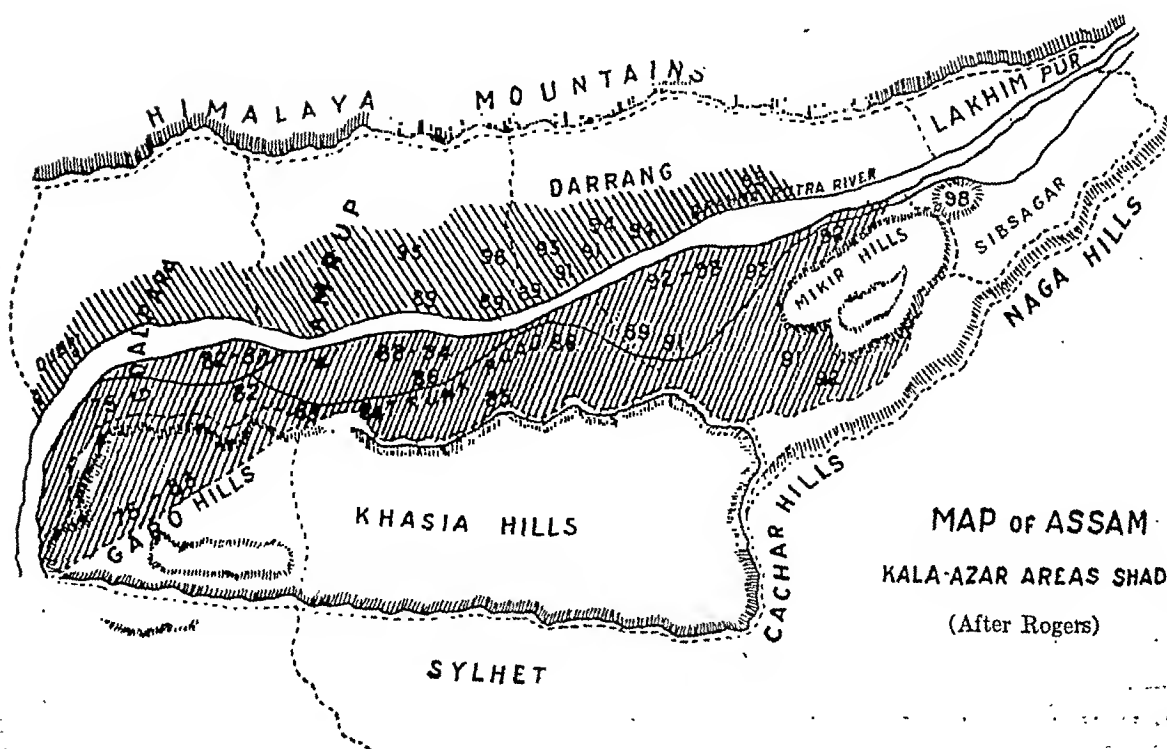
to be ankylostomiasis and later Rogers (1897) and then Ross (1899) concluded that it was a severe form of malaria for a parallel reason. Both these infections will be found in almost 100

Map 1.

MAP OF INDIA SHOWING THE
DISTRIBUTION OF KALA-AZAR
INFECTION.



Map 2.



per cent of the inhabitants of some districts of Assam (Napier, 1943).

Recent history. Researches on kala-azar during the twentieth century.—The discovery of the parasite independently and almost simultaneously by Leishman who found it in the spleen of a British soldier who had contracted kala-azar at Dum Dum near Calcutta and subsequently died in England, and by Donovan in Madras in the biopsy material from the spleen of patients suffering from kala-azar, was followed by great advances in knowledge of the various aspects of kala-azar.

Protozoology.—The parasite, *Leishmania donovani* itself, was studied first; and in 1904 Rogers and later G. C. Chatterjee cultivated the parasite in artificial medium and described the flagellate form that develops on culture of the oval form from the spleen or the peripheral blood. Further studies by various protozoologists in India, viz, Christophers, R. Row, Shortt, Mackie, Knowles, B. M. Das Gupta, J. C. Ray and others, provided comprehensive knowledge on the morphology, cultural characters and other protozoological features of this parasite.

Pathology.—The morbid changes in the body caused in kala-azar were first studied by Christophers in 1904. Of the later studies of the pathology of kala-azar in India, that of M. N. De deserves special mention because of the important contributions made to this subject.

Clinical features.—The clinical picture of the disease was further clarified by the work of Rogers, Muir, U. N. Brahmachari, Napier and others. A peculiar cutaneous sequel to kala-azar was first described by U. N. Brahmachari in 1922. He called this condition 'dermal leishmanoid'. This condition (post-kala-azar dermal leishmaniasis) was further studied by Shortt and Brahmachari, Acton and Napier, Knowles and B. M. Das Gupta, Smith, C. R. Das Gupta and other workers of the Calcutta School of Tropical Medicine.

Epidemiology.—Epidemiological studies of considerable interest on kala-azar in India were also carried out by different workers during the first thirty years of the present century. In the nineteen twenties outstanding contributions were made by the workers at the School of Tropical Medicine, Calcutta, headed by Napier, and by the Kala-azar Commission of India.

Diagnosis.—The first of the diagnostic serum tests, a globulin precipitation test, was described by U. N. Brahmachari in 1917. This test has proved of value in North China but in Bengal where there is so much malaria this test has not proved to be very specific. About 1921 various workers noted that in kala-azar the blood serum when treated with formalin gave a peculiar reaction. This became the basis of Napier's aldehyde test for kala-azar. This test has proved to be of great value in the diagnosis of chronic kala-azar. In 1927 Chopra, J. C. Gupta and David first described the antimony test. Subsequently Napier standardized the technique of this test

too. This test is of value in the diagnosis of cases of kala-azar with small splenic enlargement and of duration of over two months. In 1936 a South American worker first noticed that a positive complement fixation reaction was obtained with the Witebsky, Klingenstein and Kuhn (WKK) antigen in leishmaniasis. This finding was confirmed by Greval, Lowe and their associates (Greval, Lowe and Bose, 1939, Lowe and Greval, 1939) for Indian kala-azar. In 1939 Greval, Sen Gupta and Napier developed a technique of complement fixation test of high degree of 'specificity' and sensitiveness for kala-azar using the WKK antigen. Dharmendra next showed that similar antigen could be prepared from various acid-fast saprophytic bacilli and this gave a positive reaction with kala-azar serum. The test was further worked out by Sen Gupta (1944) and a modified technique was described by him next year (Sen Gupta, 1945). This test has proved to be of great value in the diagnosis of kala-azar and positive indication of kala-azar is usually obtained as early as the third week of illness.

The methods of demonstration of the parasite were developed soon after the discovery of the parasite; and techniques of demonstration of these in the peripheral blood, splenic puncture material, by cultural methods, etc., were described. The important recent advances were Napier's invention of a special spleen puncture syringe and the adoption of the Salah Pattern sternum puncture needle for sternal biopsy in suspected cases of kala-azar. With the former the parasite could be demonstrated in about 95 per cent of cases and with the latter in about 85 to 90 per cent.

Treatment.—Previous to the introduction of the specific treatment for kala-azar, the mortality rate was near about 90 to 95 per cent. It was in 1913, that a South American worker first reported success in the treatment of espundia, a leishmanial disease, with tartar emetic. Di Cristina and Caronia in 1915 first treated kala-azar in Italy with tartar emetic injections and obtained successful results. In the same year Rogers and Muir used this drug in Indian kala-azar.

The treatment of kala-azar with antimonyl tartrates was further developed and standardized by Knowles, Brahmachari, Muir, Napier and other workers in Bengal and Assam. The introduction of the tartrates was a great advance in the treatment of this disease, because about 70 per cent of the cases could be cured with this drug. There were however many disadvantages, viz, too long a course of treatment, frequent occurrence of unpleasant reactions, relapses and resistance to treatment, etc.

The next group of antimony compounds to be introduced were the pentavalent aromatic antimonials. H. Schmidt first introduced *p*-acetyl-aminophenyl-stibinate of sodium in 1915 for the treatment of kala-azar and Caronia first reported success with this compound.

Later work in India showed that this compound was not satisfactory. In 1922 U. N. Brahmachari prepared urea stibamine, a compound of urea and *p*-aminophenyl-stibinic acid. This drug was proved to be of value in the treatment of kala-azar by Brahmachari, then by Shortt and Sen, and later by Napier. It has been found by workers in all kala-azar areas of the world to be a very powerful therapeutic agent and one of the very best pentavalent antimonials. Numerous other antimony compounds, trivalent and pentavalent, were tested in India mainly by Napier. Of these compounds neostibosan, diethylamine-*p*-aminophenyl-stibinate, was found to be very satisfactory by Napier. The cure rate of Indian kala-azar with pentavalent antimonials in general was 95 per cent. Thus a disease of over 90 per cent mortality could be cured in 95 per cent cases. This was a remarkable achievement indeed.

The introduction of the aromatic diamidines in the treatment of kala-azar forms an important landmark in chemotherapy. Stilbamidine, 4:4'-diamidino stilbene, was synthesized by Ewins in 1939. It was used with success in the treatment of a case of Indian kala-azar by Adams and Yorke in Liverpool in the same year. During 1940 to 1941, Napier, Sen Gupta and Sen treated 101 cases of Indian kala-azar with this drug and obtained a cure rate of 98 per cent. The drug was found to be equally successful in the treatment of antimony-resistant cases of kala-azar. A neurological sequel to the administration of diamidino stilbene was first described by Napier and Sen Gupta in 1942. This finding was later confirmed by Kirk from Sudan in 1944.

Several other aromatic diamidines have been tested at the Calcutta School of Tropical Medicine, but none has been found as effective as the first compound stilbamidine.

Other important advances made were in connection with the treatment of seriously complicated cases of kala-azar. Pulmonary tuberculosis complicating kala-azar was regarded by Napier as a fatal combination, on account of the fact that the lung condition was adversely affected by the specific treatment for kala-azar. Sen Gupta (1944) showed that in such cases stilbamidine could be used for the cure of kala-azar without causing any ill effects on the tuberculous disease of the lungs. The treatment of cancrum oris, the classical and most fatal complication of kala-azar, was very unsatisfactory. The use of penicillin (Sen Gupta and Chakravarty, 1945) in the treatment of this condition during the recent years has been found to yield very satisfactory results.

Transmission of kala-azar.—Ever since the discovery of the parasite the problem of transmission of kala-azar has been of interest to all workers on this disease. It was strongly suspected that a biting insect was the transmitting agent. Rogers suspected the bed bug to be the insect vector. Patton showed that the parasite underwent some development in the intestinal

tract of the bed bug, and affirmed his belief that this insect was the transmitter of kala-azar. Later work has, however, completely disproved this hypothesis.

In 1913 Mackie suggested that the sandfly ought to be studied in connection with the transmission of kala-azar. Mackie, however, was able to find only *Phlebotomus minutus* that rarely bites man and hence there was little encouragement to follow his suggestion. Acton (1919) considered that the sandfly was concerned with the transmission of kala-azar; he based his opinion on his observations on oriental sore in Iraq.

With the opening of the Calcutta School of Tropical Medicine, a fresh start of the study of the transmission problem was made by Knowles, Napier and B. M. Das Gupta.

The epidemiological studies of Napier helped to narrow down the investigations to a particular area of the town. Smith was appointed as the medical entomologist to work with this enquiry. It was found that, except the ubiquitous bed bug, of the insects most constantly present in the affected area, the sandfly, *P. argentipes*, was the persistent human blood feeder. These workers of the Calcutta School of Tropical Medicine were impressed by the finding of this sandfly in the kala-azar area of Calcutta and in answer to an enquiry by Knowles on the subject of sandflies in the kala-azar areas, Sinton pointed out that *P. argentipes* appeared to have a distribution in India corresponding to that of kala-azar. At the time, however, this sandfly had not been reported from Assam and Madras. Knowles, Napier and Smith (1924) showed that 40 per cent of the laboratory-bred sandflies fed on cases of kala-azar developed a heavy infection with the flagellates in their midgut. In the same year the Indian Research Fund Association Kala-azar Commission with Christophers, Shortt and Barraud commenced work in Assam. Following up the observations made at the School of Tropical Medicine, they devoted considerable attention to the sandfly, and were able to confirm the Calcutta findings. They also showed that the infection in the sandfly progressed towards the mouth parts, so that if the fly took another blood meal it would in all probability contaminate the wound with flagellates. The progress of the researches was considerably helped at this stage by the discovery by Young, Smyly, and Brown in 1924 that the Chinese hamster was very susceptible to leishmania infection. The work on the transmission of the disease to the hamster by the bite of the infected sandfly was taken up enthusiastically by all the workers interested in the problem. The results of these attempts to transmit the infection by the bite of the sandfly were singularly disappointing. Though Shortt, Smith, Swaminath, and Krishnan (1931) and Napier, Smith and Krishnan (1933) and Smith *et al.* (1936) succeeded in transmitting the infection to a few hamsters out of several hundreds of animals, it

was the many failures that needed explaining, and all attempts to transmit to human volunteers were entirely unsuccessful.

The Kala-azar Commission was disbanded in 1931, and a lull in the research activities on this subject followed. In 1939, Smith was once again appointed by the Indian Research Fund Association and worked in Bihar where there was a recrudescence of the disease at the time. He was able to make a number of very important observations. He showed that survival and the progress of infection depends on whether the sandfly takes a second blood meal or subsists on fruit or plant juices. In the latter case, a large percentage of the infected flies develop a massive infection with leishmania which blocks the pharynx and the buccal cavity; when these blocked flies were fed on a susceptible animal such as the hamster or the white mouse, infection almost invariably followed. The perfection of the technique of keeping the sandflies alive for longer periods, producing 'blocked' sandflies almost at will, and transmission of the disease to a large proportion of the susceptible animals were the outstanding contributions of Smith, Halder and Ahmed (1941). Smith was unfortunately recalled on military duty in 1941, and the final experiments on human volunteers were carried out by Swaminath, Shortt and Anderson (1942) who succeeded in transmitting kala-azar to five out of six human volunteers by the bite of the blocked sandfly.

This final experiment, along with the epidemiological data and the knowledge about the bionomics of the sandfly, led to the conclusion that the usual method of transmission of kala-azar is by the agency of the sandfly *P. argentipes* in India and by other species of the sandfly elsewhere.

The solution of the kala-azar transmission problem is an achievement of medical research in India and is the outcome of years of strenuous work by the research workers of the Calcutta School of Tropical Medicine, the Kala-azar Commission, and other kala-azar research units of the Indian Research Fund Association.

On recapitulating the work done on kala-azar in India it will be noted that on almost all aspects of the disease very important contributions have been made by the different research workers in this country.

The causation of the disease, its clinical features, the morbid changes caused by it, the epidemiological factors responsible for the causation of the disease, the methods of diagnosis, synthesis of drugs that can cure 95 per cent of cases, the method of its transmission, have all been worked out by workers in India. Also the bionomics of the vector, the action of the various insecticides on it have also been worked out.

Present position of kala-azar in India.—From the above account it will be apparent that all probable methods of conquest of kala-azar are known. Also some work has been carried out in

order to establish the hypothesis that the treatment of all cases in an endemic area can lead to the control if not eradication of the disease in the area. The fact that the modern insecticides such as a DDT, pyrethrum, etc., are effective against the sandfly is also known. But little has been done by the State to utilize this knowledge, and the disease is far from under control.

In Bengal, the recorded incidence of kala-azar (which is probably a fraction of the actual incidence of the disease) has been more or less steady for twenty years during 1924 to 1943. Though the disease was showing signs of regression in certain districts in West Bengal, a study of the figures relating to the incidence carried out by Sen Gupta (1944a) showed that the trend of incidence was towards an increase in a number of districts in East Bengal, particularly in Chittagong, Dacca and Faridpur districts. By the end of 1944 and the beginning of 1945, marked increase of incidence was noticed in those districts. From certain data available at present it appears that there has been a widespread increase of incidence in different areas of Bengal. Even in Calcutta where a well-marked focus of infection was discovered about 25 years ago, the disease is not only more prevalent in that area but it has spread to other areas of the town as well.

In Assam there has been outbreaks of kala-azar in epidemic form on several occasions. In Bihar there was an epidemic of kala-azar in 1939 to 1941. The incidence is probably fairly high in certain districts of that province. No epidemics have been reported from South India during recent years.

It may seem strange and depressing that now with all our knowledge of kala-azar, its cause, diagnosis, treatment and prevention, kala-azar should persist in such large amount in many parts of North-East India and that it should actually be increasing at the present time.

It should be remembered that some of this knowledge has only recently become available, and that the application of this knowledge on a wide scale has been handicapped by war and famine conditions which moreover have probably helped to cause the increase in kala-azar.

It is to be hoped that in the near future a better public health and medical relief organization will come into operation and it will be possible to apply the knowledge about the prevention and cure of diseases to the whole country. Then only we may expect to control and even to eradicate the diseases of this country.

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Medical News

BRITISH CHEMICALS AND THEIR MANUFACTURERS, 1946

A copy of the above publication has been sent to us by the Association of British Chemical Manufacturers, 166 Piccadilly, London W.1. This Directory, includes up-to-date information regarding the manufacturers of all types of chemicals, e.g. heavy, fine, pure, etc., and supersedes both the old Directories published by the Association. A copy will be sent gratis to any inquirer writing on business paper or giving any other genuine indication of his being likely to put the Directory to good use as a purchaser of chemicals.

The Association has opened a Branch Office for India at Janmabhoomi Chambers, Fort Street, Ballard Estate, Bombay 1. All inquiries should be addressed to the Bombay Office.

JOURNAL OF THE INDIAN ANTHROPOLOGICAL INSTITUTE. VOL. 1 (NEW SERIES), 1945

This issue consists of valuable articles by eminent authors namely Dessication of Asia by Sir Aurel Stein, A Survey of Ancient Gandhara by M. E. and D. H. Gordon, Archaeological Miscellany by D. H. Gordon, Megalithic Monuments of Southern India by A. Aiyappan, and Gond Exogamy by M. P. Buradkar. They comprise highly interesting and extremely useful investigations recorded by actual painstaking field work on a geographical question in the light of history depicting the mutual relationship of the activity of man and nature (how the damage done by man is made good by nature), archaeological contents from sites of antiquity and ancient cultures with outlined sketches of paintings and engravings, exogamy of a primitive type which may have an important bearing genetically as to the advisability or otherwise of the marriage of blood relatives (to avoid incest). The

findings admirably indicate how cultures in early times were already far more differentiated than has hitherto been thought of. The journal is informative and complete with illustrations, map and bibliography. This type of journal is of interest not only to anthropologists, archaeologists and prehistorians but also to the social biologists, psychologists and geneticists. It is hoped that a regular publication of this exceedingly useful journal will stimulate anthropologists, present and future, to explore further for the growth of the national life of India.

J. N. B.

USE OF 'HUMAN GUINEA-PIGS' IN PRESSURE CHAMBER TESTS BY NAZIS

(Abstracted from the *Journal of American Medical Association*, 14th September, 1946, p. 84)

ARMY Air Forces Headquarters has disclosed after study of captured enemy medical reports that 'human guinea-pigs' were successfully used in German pressure chamber tests up to 30,400 feet without oxygen. The research was carried out in German laboratories in the Dachau internment camp by Nazi scientists and doctors during April 1942. Tests were made on human subjects at the direction of Heinrich Himmler, Gestapo chief. Records in the Office of the Air Surgeon reveal that tests placed human beings at a higher artificial altitude without oxygen than ever before reached. The U.S. Navy in operation 'Mount Everest' raised volunteer personnel to 29,025 feet.

DIPLOMA IN OPHTHALMIC MEDICINE AND SURGERY, CALCUTTA UNIVERSITY

THE first course of lectures as required for both parts of the Diploma in Ophthalmic Medicine and Surgery Examination of the University of Calcutta started at the Eye Infirmary, Medical College Hospitals, Calcutta, on 5th May, 1947.

The subjects include the following :—

Part I—Anatomy,	Part II—Pathology.
Physiology.	Bacteriology.
Optics.	Ophthalmic Medicine.
	Medical Ophthalmology.
	Ophthalmic Surgery.
	Operative Surgery.

The following are giving the lectures :—

- Capt. E. J. Somerset, M.S. (Lond.), I.M.S., Professor of Ophthalmology, Medical College, Calcutta.
- Dr. S. C. Sinha, F.R.C.S. (Edin.), Professor of Anatomy, Medical College, Calcutta.
- Mr. T. Ahmed, F.R.C.S., D.O.M.S., Hony. Ophthalmic Surgeon, Medical College, Calcutta.
- Capt. K. Sen, F.R.C.S., D.O.M.S., Hony. Ophthalmic Surgeon, Medical College, Calcutta.
- Dr. B. K. Das Gupta, F.R.C.S., D.O.M.S., Hony. Junior Visiting Surgeon, Eye Infirmary, Medical College Hospitals, Calcutta.
- Dr. P. K. Guha, M.R.C.S., L.R.C.P., D.O.M.S., Hony. Junior Visiting Surgeon, Eye Infirmary, Medical College Hospitals, Calcutta.

TRAINING OF PROBATIONER NURSES IN U.K.

THE following ladies have been selected for training as Probationer Nurses in the U.K.

Centre

- Miss Aansuya Subramaniam.
Miss Nasim Farhat Ahmed.
Miss Masuda Bhatti.
Mys. Sarla Anand.
Miss Khurshid Butt.

United Provinces

- Miss Mary Clara Xavier.
Miss Beatrice Doreen Ghose.

Punjab

Miss Munawar Fateh.
Miss Sharanjit Kaur.
Miss Kumari Sanyokta Bhatta.

Central Provinces

Miss Teresa Hackett.
Miss Indumati Deshpande.
Miss D. Lazarus.

Orissa

Miss I. M. Samuel.

Bengal

Miss Lillian Nomita Biswas.

Madras

Miss H. M. Hurtis.

Bombay

Miss Sarala Bakaya.

Arrangements for placing the candidates in suitable institutions in U.K. are being made and the candidates concerned will be informed about the arrangements in due course.

HEALTH DEPARTMENT,
NEW DELHI,
20th June, 1947.

'PALUDRINE'—INDIA, JUNE 1947

Issued by Imperial Chemical Industries (India), Ltd.
Medical Services Department, June 1947]

THE undernoted dosage recommendation made by the Imperial Chemical Industries, Ltd., as a result of the clinical trials which have been carried out in India during last year, 1946-47. These definite recommendations supersede the suggestions made in leaflet reference—TII.—Printed in England—No. 240620-1/25/946'.

Treatment of Malaria with 'Paludrine'

Clinical cures of all types of malaria can be obtained by single doses of 'Paludrine'. It is recommended that a 'single-dose' treatment of 0.3 gm. (three tablets) should be given to achieve clinical cure.

To obtain a radical cure of malignant tertian malaria 0.1 gm. (one tablet) three times a day for ten days should be given. This treatment can be shortened, if so desired, by giving larger doses over a correspondingly shorter period.

The radical cure of benign tertian malaria is still being investigated. Present knowledge indicates, however, that if the co-operation of the patient can be obtained the acute attack should be controlled and then 0.1 gm. (one tablet) should be given twice weekly at spaced intervals for six months.

Protection against Malaria through 'Paludrine'

One tablet (0.1 gm.) twice weekly at spaced intervals (e.g. Wednesdays and Sundays) will give complete causal prophylaxis against malignant tertian malaria. 'Paludrine' is the only drug which will achieve this effect in easily tolerated doses. This treatment also gives effective clinical prophylaxis against benign tertian malaria.

If for any reason twice weekly dosage is not possible, a very good degree of protection can still be expected from one tablet (0.1 gm.) given only once per week. Should, however, hyperendemic malarial conditions prevail, and the once weekly routine is preferred, the dose must be increased to three tablets (0.3 gm.) each week.

Children's Dosage

It is recommended that, both for treatment and protection, children above 10 years should be treated as adults. In the case of children under 10 the dose

should be individualized according to age and size, but no child need be given less than 0.025 gm. ($\frac{1}{4}$ tablet).

FOURTH INTERNATIONAL CANCER RESEARCH CONGRESS, ST. LOUIS, MISSOURI, U.S.A., 2ND TO 7TH SEPTEMBER, 1947. HEADQUARTERS: JEFFERSON HOTEL, 415 NORTH TWELFTH STREET, ST. LOUIS

SPONSORED BY UNION INTERNATIONALE CONTRE LE CANCER AND THE AMERICAN ASSOCIATION FOR CANCER RESEARCH

Programme

DR. SHIELDS WARREN, New England Deaconess Hospital, Boston, Massachusetts, is Chairman of the Programme Committee. Dr. Sidney Farber of Harvard Medical School is Vice-Chairman. Other members of the committee are: Dr. V. R. Khanolkar, Bombay, India; Dr. J. Maisin, Louvain, Belgium; Dr. John J. Bittner, Minneapolis, Minnesota; Dr. Ingacio G. Guzman, Mexico, D.F.; Dr. Walter M. Simpson, Ann Arbor, Michigan; Dr. Alexander Haddow, London, England; Dr. A. Lipschultz, Santiago de Chile, South America; Dr. Arthur W. Ham, Toronto, Canada; Dr. Antoine Lacassagne, Paris, France.

Two types of scientific sessions are planned: (1) Long papers by invitation of the Executive Committee of the Congress on selected topics, and (2) short papers, titles of which should be submitted by those desiring to participate in the Congress.

The general sessions (invitation programme) will include presentations on the following topics:—

- Sept. 3—1. General Aspects of Cancer Research; Cancer Surgery; Radiation Therapy of Cancer.
2. Aetiology of Cancer.
- Sept. 4—3. Aetiology of Cancer (Carcinogens).
4. Chemistry in Relation to Cancer.
- Sept. 5—5. Hormones and Cancer.
6. Biology of Cancer.
- Sept. 6—7. Nuclear Physics in Relation to Cancer.
8. Cancer and the Host.

Persons desiring to present papers should submit titles and abstracts of not more than 250 words to the Chairman of the Programme Committee before 1st July, 1947. Titles and abstracts should be in English. The Programme Committee reserves the right to accept or reject such papers.

Manuscripts of the papers presented should be submitted at the Congress for publication. Manuscripts in English, French, German, Russian or Spanish will be acceptable.

Exhibits

Dr. G. W. Larimore, American Cancer Society, 47 Beaver Street, New York 4, New York, is Chairman of Exhibits Committee. Sub-Committee Chairmen assisting Dr. Larimore are as follows:—

Dr. Bruno Gebhard, Dr. Sherwood Moore, Dr. Roy Hertz, and Dr. Philip S. Owen.

Titles and brief descriptions (not over 250 words) of exhibits should reach the Chairman by 1st July, 1947:—

1. Emphasis should be put on (a) results of laboratory and clinical research on cancer; (b) the materials and equipment used in cancer research; and (c) organizations promoting cancer research.
2. Exhibits should be as dynamic as possible. Attempts will be made to provide apparatus and such facilities as may be required for special display of animals, microscopic preparations, films, etc.
3. Commercial organizations may help in providing equipment for individual exhibits but space will not be available for strictly commercial exhibits.

Attendance and Regulations

All investigators or persons interested in cancer research are welcome. A registration fee of \$10.00 will be charged of all attending the Congress except the official delegates.

Schedule of Events (subject to change)

- Monday, Sept. 1—(Labour Day, An American Holiday). Arrival of delegates.
- Tuesday, Sept. 2—A. Registration.
 B. Visit to the State Cancer Hospital, Columbia, Missouri. (Transportation by motor bus will be arranged by Dr. Arneson for those making reservations not later than 1st September. Leave at 10 a.m., return at 5 p.m. Round trip—250 miles.)
 C. 9-30 a.m.—Meeting of delegates in Room 4, Floor 3, and election of officers, chairman and secretary.
 D. 2-00 p.m.—Business meeting of delegates.
 E. 8-00 p.m.—Reception.
- Wednesday, Sept. 3—A. Scientific sessions and meeting of delegates.
 B. 7-00 p.m.—Dinner. Message from President Truman. Brief welcoming addresses by Governor, Mayor and others.
- Thursday, Sept. 4—A. Scientific sessions, meetings of delegates and visits previously arranged.
 B. 7-00 p.m.—Dinner. Symposium on cancer research.
- Friday, Sept. 5—A. Scientific sessions, meetings of delegates and visits previously arranged.
 B. 7-00 p.m.—Dinner. Discussion on organization and financing of cancer research.
- Saturday, Sept. 6—A. Scientific sessions, meetings of delegates and visits previously arranged.
 B. 7-00 p.m.—Dinner. Reports of delegates.
- Sunday, Sept. 7—A. Concluding meeting of delegates.
 B. Motor trip to the State Cancer Hospital.

Executive Committee

This Committee consists of the President of the Congress, Dr. E. V. Cowdry, Barnard Free Skin and Cancer Hospital, St. Louis 3, Missouri, and the chairmen of the main committees listed above. Dr. J. Godart, President of the Union Internationale Contre le Cancer, and Dr. J. J. Bittner, President of the American Association for Cancer Research, are members *ex-officio*.

The office of the Executive Committee will be in the Art Gallery, Floor 2, of the headquarter's hotel.

FIFTH ALL-INDIA OBSTETRIC AND GYNÆCOLOGICAL CONGRESS

The Fifth All-India Obstetric and Gynæcological Congress will be held at Bombay from the 25th to 28th December, 1947.

The subjects for discussion will be :—

(1) Dystocia, (2) Sterility, and (3) Neonatal deaths; besides other scientific papers, demonstrations and exhibitions.

SIR ALMROTH EDWARD WRIGHT (1861—1947)

By PROFESSOR A. M. LOW

(From Release No. F.710, dated 24th June, 1947, offered by the United Kingdom Publicity Services, New Delhi)

Few people realize that the laboratory in which penicillin, the 'wonder' drug, was first discovered, was also the workshop of another great medical researcher, Almroth Wright, who served on the Indian Plague Committee and did all in his power to alleviate the frightful outbreaks of typhoid raging amongst troops in India towards the end of the last century.

The work of Almroth Wright, who died on 30th April, 1947, in Britain, was begun 50 years ago at the Army Medical School, Netley. He was the originator of the system of anti-typhoid inoculation for bacterial infections, known as vaccinotherapy, which was responsible for saving millions of human lives, both soldiers and civilians.

Throughout his long life Almroth Wright was a hunter and destroyer of those deadly microbes that wage unceasing war on human beings. His success can easily be gauged by comparing the lives lost by typhoid fever before his discovery and methods of immunization were available.

In the Boer War, except where Wright's methods were carried out—in face, be it said, of opposition from those in authority—more men died of fever than were killed in action. In World War I only half as much typhoid was recorded and only one-seventh the number of deaths.

Travelling prize winner.—In the Franco-Prussian War one German soldier in 16, it is stated, caught typhoid fever, against a figure of one in every 900 of the British troops in World War I.

Almroth Edward Wright was the son of a distinguished Irish clergyman and a Swedish mother. Educated on the Continent and then at Trinity College, Dublin, he soon proved his high intellectual ability and won a gold medal in modern literature.

From Dublin, Almroth Wright went to London, where he began to study law, but when later he gained a medical travelling prize at Dublin, he discarded legal training for further studies on the Continent, where he stayed at Leipzig, Strasbourg and Marburg, finally returning to Ireland and taking his M.B., B.Ch., and M.D. degrees at Trinity College, Dublin.

Medicine was his chosen career, and after indulging in original work at the Royal College of Physicians, Wright was offered the post of Demonstrator of Pathology at Cambridge in 1887.

Research on inoculation.—A year later the opportunity arose to visit Australia through his acceptance of the Professorship of Physiology at the University of Sydney. This post he held

until 1892, when he returned to England to work as Professor of Pathology at the Army Medical School, Netley.

Wright's interest had been aroused by certain experiments made on men suffering from cholera by inoculating them with bacteria, and by information published regarding cases of typhoid, also treated by inoculation. He determined to carry out detailed research into the subject of inoculation and into the use of anti-typhoid vaccines.

A few years later, in 1896, Wright published the results of some of his experiments. His theory, on which his work was based, was that healthy blood may not have the germs necessary to fight those attacking the patient, so he introduced vaccine into the healthy blood before inoculating the sick man.

Special department created.—Wright left Netley in 1902 to take up an appointment as Pathologist at St. Mary's Hospital, London. There he created a special department of therapeutic inoculation, later to be re-named the Institute of Pathology and Research. Up to the last year of his life Wright visited St. Mary's to work in this department, and for 40 years, so it is said, drew a small amount of his own blood daily for experimental purposes.

During the First World War he served in France as Consulting Physician to the British forces, and provided during the four years of war enough anti-typhoid vaccine for 4,500,000 persons.

He also worked on treatment of wounds and obtained satisfactory results by using solutions containing no antiseptics, in distinction to the Carrel-Dakin method, which kept the wound continually in an antiseptic bath and drained away the pus.

That great British scientist, Sir Alexander Fleming, discoverer of penicillin, was a pupil of Almroth Wright's, and it was in Wright's laboratory that the discovery of the 'miracle' drug took place.

DR. S. N. CHANDRA

DR. S. N. CHANDRA, M.B., Captain, I.M.S. (late), a retired Senior Gazetted Officer in the Imperial Serologist's Department, died on 5th April, 1947.

He had lost his father in his boyhood and had to struggle much as a youth. He graduated from the Calcutta Medical College in 1916 and worked as a House Surgeon in the Medical College Hospitals, Calcutta. After serving in the 1st World War for about 2 years he joined the Imperial Serologist's Department in 1920. He officiated as the Imperial Serologist and Chemical Examiner to the Government of India, and Professor of Serology and Immunology in the School of Tropical Medicine, Calcutta, on several occasions.

He was a very resourceful laboratory man and rendered much help in starting the Blood Transfusion Service and Blood Bank of Calcutta, the first institutions of their kind in India. His colleagues valued his criticism and enjoyed his subtle humour.

He was one of the ardent supporters of the Dramatic Club of the Calcutta Medical College and had been an actor of a very high order.

He leaves behind him his wife, three sons, three daughters and a large number of friends and colleagues to mourn his loss.

He came of the well-known Chandra family of Calcutta.

Dr. Chandra retired in 1945 intending to do many things in his well-earned leisure, including a prolonged stay at Benares.

DR. AMAR NATH GUPTA

DR. AMAR NATH GUPTA, the Dermatologist, passed away at his residence in Short Street on the 10th March, 1947, at the age of 52.

He passed the M.B. examination of the Calcutta University in 1918 and served in the World War I in the Indian Medical Service. On demobilization in 1922, he proceeded to the United Kingdom for post-graduate studies in Dermatology. He returned home in 1923 and commenced practice as a Dermatologist in Calcutta. He was ambitious and a keen seeker after truth. For some time he worked as Honorary Dermatologist in the Howrah General Hospital. Later, when a Dermatology Department was opened in the Carmichael Medical College Hospital and in the Medical College Hospital he was appointed Honorary Dermatologist in both the hospitals.

Dr. Gupta was the Research Scholar of the Calcutta University for two successive terms, and a member of the Executive Committee of the Calcutta Medical Club for a number of years. He read original papers in the Calcutta Medical Club and wrote articles in the *Calcutta Medical Journal*, *Indian Medical Gazette* and other medical journals, which were highly appreciated by the medical profession.

He was of an amiable nature and sociable disposition for which he was liked by his friends, colleagues and students. During the last 3 or 4 years he lived under the shadow of death but attended to his professional duties in the hospital as well as in the practice until 3 or 4 months ago. He bore the pain with great patience and was always cheerful.

He leaves behind his widow and an only child, a girl of 16 years of age. His loss is keenly felt by his friends and colleagues.

BRITISH MEDICAL JOURNAL

22nd February, 1947

THE following extracts from this two-page number will be of interest:—

'This, the smallest *B.M.J.* since 1840, has been "printed" on hand-operated duplicators in B.M.A. House, by permission of the Ministry of Fuel and Power and the C.O.I. Our "printer" this week is the Secretary of the B.M.A.'

'*Coal and medicine.*—Shivering, we tend to think of coal only as fuel. Coal is medicine as well. Runge discovered in 1834 carbolic acid, a coal-tar product. With carbolic Lister stoked the fires of surgery for posterity. Perkin's discovery of the aniline dye mauve in 1856 was the starting point of modern medicine. Weigert in 1871 stained bacteria with the aniline dyes of coal-tar, and Koch soon followed suit. Ehrlich hit upon the idea that certain cells had chemical affinity for certain dyes. This led to differential staining of tissues and the birth of chemotherapy. The red dye-stuff prontosil, patented in 1932, began a revolution in medical treatment—with the sulpha drugs. The malarial remedies, mepacrine and paludrine, depend for synthesis on coal-tar distillates. From naphthalene comes the synthetic analogue of vitamin K. Phenol is the chemical parent of a common purgative, of aspirin, and of the synthetic oestrogen, stilboestrol. Coal gives doctors their most potent remedies and research workers essential chemical instruments. And if nylon that comes from coal is wanted by colliers' wives for stockings the surgeon also wants it for his sutures.

Points from letters.—C. A. Wells says pentothal-curarc anaesthesia gives agreeable induction, complete relaxation, a quiet field, and rapid recovery; G. S. A. Knowles urges use of prostigmin at end of operation to combat apnoea; J. Montgomerie finds hyoseine HBr. 1/100 gr. (0.65 mg.) prevents excessive salivation on recovery from curare. H. W. Barber surprised that our leader (Jan. 18, p. 96) mentions endocrine receptors as new conception, quotes B. Bloch (*Brit. J. Derm. Syph.*, 1931, **43**, 61). D. A. Long believes stomatitis caused by penicillin plus sucrose base, prefers viscous base pastille. G. Hale suggests serum from parent (must have had measles) when no convalescent serum. D. Blatchley says sore throats after "endotracheal" caused by combination of Hg. binitodide antiseptic and amethocaine lubricant. R. J. Brocklehurst thinks many doctors' children at medical schools are unsuitable for medicine. C. K. Robertson says neurological complications in atypical pneumonia treated with sulphonamide may be due to the drug.

Other items in this number are Diary, News, Obituary, Epidemiology, Any Questions and Advertisement Vacancy.

THE CALCUTTA UNIVERSITY (AMENDMENT) BILL AND THE BENGAL UNIVERSITIES BILL

MR. N. C. SEN, M.A., B.L., has sent the following abstract of the above bills for publication. Paragraphs 2 and 4 are of medical interest.

The Calcutta University (Amendment) Bill seeks to democratize the constitution of the Calcutta University. It seeks to abolish the ten Ex-Officio Fellows, and increase the number of Elected Ordinary Fellows from 20 to 75, and fix the number of Ordinary Fellows at the constant figure of 110, of which 30 to be elected by Registered Graduates, 45 to be elected by Teachers, and 35 to be nominated by the Government. Any person may, immediately after graduating in any Faculty, be enrolled as a Registered Graduate (without waiting for 10 years as now prescribed) on payment of a single fee (instead of recurring annual fees). The Teachers shall not be qualified to be elected from the constituency of Registered Graduates. Elections shall not be subject to the approval of the Chancellor. The Vice-Chancellor is to be elected by the Ordinary Fellows and to hold office for 5 years. Every Ordinary Fellow must belong to one and not more than two Faculties. Each Faculty may co-opt members (graduates in that Faculty or persons having special knowledge in respect of the subjects of study represented by that Faculty) not exceeding the number of Fellows constituting the Faculty. All members of a Faculty shall have equal rights. In the Syndicate, all Faculties will be equally represented. Two useful Faculties, viz, Technology and Economics, will be created.

It is obvious that the Bill offers larger and better representation to the Medical Profession in the University than now. Medical Graduates may immediately after graduation be enrolled as Registered Graduates, and will have a larger scope and voice in election of a larger number of Fellows. The enlargement of the Medical Faculty and the election of the majority of the Fellows will offer scope to a larger number of independent practitioners to be associated with the University.

The other Bill, the Bengal Universities Bill, goes a step further. At the first instance, it seeks to declare the Viswa-Bharati at Bolpur and the National Council of Education, Bengal, at Jadavpur as independent Universities. The jurisdiction of Dacca University is to be extended over Dacca Division. The Government Colleges at Hooghly, Rajshahi and Chittagong are respectively to be constituted into independent Universities for Burdwan, Rajshahi and Chittagong Divisions. All recognized educational institutions within the territorial jurisdiction for the time being of every University will be deemed to be affiliated to it. Further, any institution or group of institutions in any area may be incorporated as a new University. A

Board of Education is to be created with equal representatives of the Provincial Government and the several Universities. The function of the Board shall be to co-ordinate work among the Universities in order to avoid duplication of work and expense and help development of the Universities according to the local needs.

It is possible under the Bengal Universities Bill to raise the Medical Schools to the status of Medical Colleges affiliated to one or another of the Universities. The various State Faculties, such as Medical, Ayurvedic, etc., may be merged into the proposed Board of Education with profit. The Calcutta Medical College and the Carmichael Medical College may also be constituted as one or more independent Universities for medical education only, if thought fit. The big Hospitals and other medical institutions may be converted into institutions for post-graduate studies and research and practical training affiliated to one or another of the Universities.

AGAR AGAR FROM INDIAN GRACILARIA

(Abstracted from the *Science and Culture*, Vol. 12, No. 7, January 1947, p. 333)

Gracilaria confervoides, available in the salt water of Chilka Lakes in the east coast of South India, is considered as a suitable raw material for the production of agar agar (*J. Proc. Inst. Chem.*, India, **17**, 1945).

The process for preparing agar involves first in clearing and washing the weed and then extracting it with four times its weight of boiling water for about six hours. The extract is filtered through cloth, poured into shallow enamelled tray and left in a refrigerator overnight. The frozen material is then thawed at about 10°C. and the water decanted. The solidified agar is cut into strips and dried in the sun. Further purification, if required, may be effected by dissolving the material in hot water, decolorizing with charcoal, and freezing the filtered solution. The agar thus produced is found to be satisfactory for culture media in bacteriological work and for use in the preparation of food products.

THE MORALE OF THE SOLDIER

(Abstracted from the *Journal of American Medical Association*, 30th November, 1946, p. 807)

At the Royal Society of Medicine was witnessed the unusual occurrence of a lecture on a medical subject by Field Marshal Montgomery, who delivered the Lloyd Roberts Lecture, on the morale of the soldier. High morale, he said, was a quality without which no war could be won, and it should interest the medical profession because it was a mental product. As a citizen he would reflect the national character, which was therefore of great importance, and anything that weakened this weakened the army. In war the moral stature of some men would increase. Others, under the stress of battle, surrendered to fear and to fatigue and allowed their characters to disintegrate. Morale was a mental quality which maintains human dignity and develops latent heroism. High morale drew a man forward against his own desires. It is not toughness, though tough men may occasionally perform high acts of bravery. Four basic factors are essential to high morale: leadership, discipline, comradeship and self-respect. Good morale is impossible without good leaders; all men are frightened at some time or other to a greater or less extent, and in fear men band together and look for guidance. At such moments they are not capable of standing alone: they find the burden too great. The leader accepts the burdens of others and earns their gratitude thereby and the right to lead them. The quality men recognize in their leader is decision. Fear makes a man sluggish and indecisive. The leader's power over his men is based



Fig. 1.



Fig. 2.

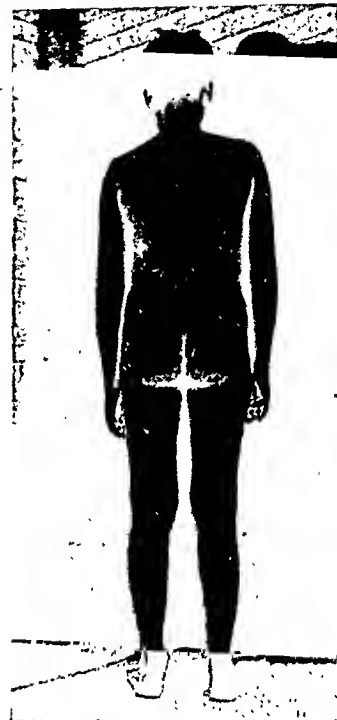


Fig. 3.



Fig. 4.

PLATE XII

FOURTEENTH CLINICAL MEETING OF THE CALCUTTA SCHOOL OF TROPICAL
MEDICINE HELD ON 5TH FEBRUARY, 1947. A CASE REPORT : G. PANJA.
(M. N.) PAGE 291



Fig. 1.

on his ability to cut through that fear paralysis and to help others to escape from it. His greatest asset is his ability to act normally in abnormal circumstances and to think rationally when his men have ceased to think.

The object of discipline is the conquest of fear. The basis of fear is the awareness of danger, which comes when a man thinks that he is opposed by something more powerful than himself. Discipline helps him to lose his own identity and create a corporate sense. It also implies a conception of duty; but Montgomery thought that this did not embrace abstractions, such as freedom, democracy, empire. A man's sense of duty extended to the friends around him.

This brought Montgomery to his third factor, comradeship. Morale cannot be good unless men come to have affection for one another. Comradeship is the great antidote to fear. Self-respect, his fourth factor, develops if the other three are present. A powerful contributory factor to morale is success; it is not possible to maintain morale during a long period of defeat.

Finally, the Field Marshal returned to his theme that the soldier is first of all a citizen. Nothing weakened a man more than trouble at home. The soldier had to have good living conditions and always good food, but there is a danger of considering welfare as an end. It will never produce high morale by itself because it is essentially soft. Hardness and privation are the school of a good soldier, idleness and luxury his enemies. It was not for nothing that one of the great rallying calls of the British had been the cry 'Blood, toil, tears and sweat'.

OPIMUM SMOKING PROHIBITED

(Abstracted from the *Indian Information*, Vol. 15, No. 198, 15th December, 1946, p. 455)

IN fulfilment of their international obligations and in their earnest desire to co-operate in weaning mankind from a pernicious habit, the Government of India have, in consultation with the Provincial Governments, now decided to prohibit altogether the smoking of opium in British India, exception being made only in favour of existing addicts so long as they survive and subject to their producing medical certificates in terms to be prescribed.

As regards the Indian States, 75 at least have already prohibited or are now prohibiting absolutely the smoking of opium within their territories, while the rest are making declarations on lines similar to that now made by the Government of India.

FORMATION OF AN INDIAN PSYCHIATRIC SOCIETY

FOLLOWING a meeting of psychiatrists in India held in Delhi on 7th January, 1947, it has been decided to form the Indian Psychiatric Society. The purpose and scope of the proposed society is the promotion of mental health among the people of India, including the prevention and treatment of mental disability.

There being, at present, very few psychiatrists in the country, it was decided that initially the society should consist of a small nucleus of practising and qualified psychiatrists, and that other medical practitioners and workers in related social schemes, such as psychology, education, and anthropology, should be invited to participate as members or associate members.

The tasks of the society were realized to include the setting of standards of education and training in psychiatry of doctors generally, and of psychiatrists and their co-workers particularly, and the urgent necessity of stimulating active interest and understanding of problems of mental health among administrative bodies, and the general public.

The first general meeting will be held on the occasion of the next session of the Indian Science Congress.

It is proposed to begin the publication of an Indian Journal of Psychiatry as soon as possible.

Lieut.-Colonel J. E. Dhunjibhoy, I.M.S., was elected the first President of the Society and Major R. B. Davis, D.S.O., I.M.S., of the European Mental Hospital, Ranchi, was made the Secretary.

FOURTEENTH CLINICAL MEETING OF THE CALCUTTA SCHOOL OF TROPICAL MEDICINE HELD ON 5TH FEBRUARY, 1947

DR. G. PANJA showed a Hindu male patient, aged 35, with a cauliflower-like growth on his glans penis and inner surface of prepuce (see figure 1, plate XII). The growth is soft, painless, non-ulcerated and not bleeding on pressure. The external meatus of the urethra is free for urine to pass, though obscured by the growth. No inguinal glands are palpable. No discharge from the meatus seen. General health of the patient is good.

History of phimosis from boyhood; discharge of purulent fluid from the phimosis and irritation inside. Operated one year ago, prepuce was cut off and sutured. No history of venereal disease or sexual intercourse. Recently married. W.R. is negative. Histological examination of the growth shows proliferation of the prickle cell layer of the epidermis and consequent growth of the interpapillary processes into the dermis. Invasion through the basal cell layer, cell-nests and mitotic figures are absent. Parakeratosis is present in the horny layer. Cellular infiltration and dilatation of blood vessels are seen in the upper part of the dermis. Polymorphonuclear cells and micro-organisms are not seen.

Diagnosis.—Papillated growth very similar to venereal wart or condyloma acuminatum. Differential diagnosis was considered regarding epithelioma and granuloma—either venereum or lupoid or syphilitic. Histological picture negatives such a diagnosis. The condition is not likely to be potentially malignant, as it is rapidly improving under x-ray exposure and application of gentian violet lotion. Excision is out of question on account of involvement of the glans.

Such papillated growths have also been seen in two cases affecting the vulva and anus. Injection of filtrate of the smashed growth along with the local treatment is giving encouraging results. It is probable that the condition is due to some filter-passing virus.

Lieut.-Colonel G. Ahmed demonstrated a case of malignant tumour of testis; the patient, aged 22 years, was admitted to hospital on 8th January, 1947, with history of progressive enlargement of the right testis for 5 months, left breast 4 months and right breast 3 months and absence of erection for 3 months. There was a very hard, heavy mass, vertical diameter 12 inches on the right side of the scrotum, inguinal lymph nodes were not enlarged and no para-aortic mass was felt. Breast enlargements were right 3½ inches and left 2½ inches in diameter, soft and not adherent to pectoral muscles. Lower 2/3rd of right lung was dull on percussion and silent on auscultation. Skiagrams revealed opaque shadow of whole of right chest suggesting metastasis and no enlargement of pituitary fossa or calcified patch in the shadow of right testis. Hæmoglobin 65 per cent; white cells 6,000, cholesterol 120 mg. per 100 c.c. Excised tumour of the testis showed nodules of cartilage scattered in great abundance throughout section and cystic spaces containing blood or yellowish glairy fluid; microscopic examination revealed hyaline cartilage, blood vessels and incomplete tubular spaces lined by columnar epithelium. It was a case of teratoid tumour of testis with metastasis in the right lung, with development of opposite secondary sex characters as an interesting feature.

Dr. L. M. Ghosh showed a case with marked hyperkeratosis (cutaneous horns) on the dorsum of the hand and on the dorsum and sole of the feet together with a certain amount of generalized keratosis, angular cheilitis of the mouth and sore tongue. On the face of it the case seemed to be one of avitaminosis or rather dysvitaminosis. The trend of discussion was for carrying on the investigation for vitamin deficiency.

Major Goodall, I.M.S., showed two hæmatological cases. The first case was one of early sub-acute combined degeneration in a Gurkha female, 38 years of age. She had a history of weakness of the legs, gradually progressing since an attack of fever 10 months previously, until she could no longer walk. No history of syphilis, malaria or other illnesses. W.R. was negative. On examination, the patient was seen to be very ataxic, and showed marked inco-ordination with a positive Romberg sign. Weakness was more evidenced in lower than in upper limbs. Reflexes were exaggerated in the lower limbs but the right abdominal reflex was absent. Investigation showed a normal blood picture with slight megaloblastic reaction in the bone marrow. Cerebro-spinal fluid was normal. Differential diagnosis was made from disseminated sclerosis and transverse myelitis, syphilitic. The second case was one of tabes dorsalis in a man of 40 years. He had a history of severe pains and pricking sensations in the legs with progressive weakness during the past 8 months. He was now unable to walk. There was also weakness of the upper limbs. Previous history of untreated syphilis 20 years ago, and malaria. Examination showed him to be extremely ataxic. Pupils gave a sluggish reaction to light. There was weakness of the lower limbs with marked inco-ordination and Rombergism. Muscles were flaccid and showed wasting. There was some sensory loss. Reflexes were absent. Investigations showed his W.R. to be positive both in blood and cerebro-spinal fluid. Lange-gold curve was tabetic in type. Differential diagnosis was made from peripheral neuritis.

Dr. Habibur Rahman showed a case of pseudo-hypertrophic muscular dystrophy in a Hindu boy, aged 12 years. Weakness in his legs and difficulty in moving about were noticed as early as 8 years back, which have since been increasing, and in the last 3 years there has been increasing difficulty in getting up from bed. The father says that the boy developed the disease after an attack of eczema on the legs. The patient is the last but one child of the parents and has two sisters and five brothers living. The first (sister) and the last (brother) died of fever. There is no such disease in the family, nor in the paternal or maternal side. Clinical picture—marked lordosis and winging of the scapulae, gait waddling. The boy stands on a wide base. There is symmetrical and marked enlargement of the calf, thigh and gluteal muscles; girth at calf 13½ inches, at thigh 15 inches. Infra-spinatii are also enlarged. Pectoralis major wasted on both sides. Face normal. When the patient is asked to get up from recumbent posture, he at first rolls his body on to his face, levers up on the limbs and comes to the erect posture by climbing on his thighs as in a typical case of pseudo-hypertrophic muscular dystrophy. Tendon jerks are lost in the lower extremities and very weak in the upper. Treatment with vitamin E produced no appreciable benefit.

Dr. M. Mukherji discussed a case of Richter's hernia strangulated in the first descent in a congenital right inguinal hernial sac. A Hindu male, aged 25 years, cultivator, was brought to the Campbell Hospital on 23rd January, 1947, with severe (colicky?) pain all over the abdomen. Three days previously the patient went to have a stool at midnight. The stool was a constipated one and was followed in a few minutes by colicky pain around the umbilicus. The pain increased and spread all over the abdomen and a cord-like swelling near the right groin was noticed. There were several vomits a few hours later. Next morning the patient noticed that his scrotum was swollen on the right side. No flatus or faeces was passed since the onset of pain.

Gradually the abdomen got distended and the swelling in the scrotum increased. Patient took fluid feeds throughout. There was no vomit since admission. On examination, patient did not look very toxic or dehydrated, tongue slightly moist, pulse 100, blood pressure 120/90, temperature 98.4°F. Abdomen was moderately distended with prominent coils of intestine showing visible peristalsis. Liver dullness was present. Shifting dullness was not present. Auscultation proved increased peristalsis. In the region of the internal abdominal ring and lateral half of the inguinal canal a slight fullness and a small tense swelling (1 inch by ½ inch) were felt. The spermatic cord below the swelling was felt to be thicker than the left. The right side of the scrotum was distended with opaque fluid under low tension. Testes were normal and not painful though the patient gave history of an old orchitis on this side. An enema was given with no result. Under open ether anaesthesia the right inguinal canal was opened. On opening the sac a small bit of intestine was found slightly congested on the lateral side and blood-stained fluid welled up from the scrotal side. The intestine was relieved from the constricting band just below the neck of the sac. About 3 inches of the loop was pulled out from the proximal portions of the intestine. Obviously the mesentery was short and the portion of the gut that was strangled was found to belong to the lowest part of ileum. About three-fourths of the circumference was incarcerated. The sac on the scrotal side was found to be continuous with the tunica vaginalis which contained about 4 oz. of blood-stained fluid. The intestinal wall regained peristaltic movements after warm applications and was replaced into the abdominal cavity. The upper portion of the sac was excised at the neck and the lower half was everted on the testis as in hydrocele operations. The wall of the inguinal canal was not repaired. The patient made an uneventful recovery.

Dr. Sachchidananda Banerjee discussed a case of glycosuria with low renal threshold for glucose associated with hypovitaminosis C. This type of cases is not very common and an error in diagnosis might expose the patient to unnecessary and even harmful treatments. The patient, a 38-year-old Bengali Mohamadan male, tailor, was admitted into the hospital on 16th January, 1947, with complaints of weakness, frequency of micturition and passage of sugar in urine for two months. He told that his father died of diabetes. Routine tests revealed only presence of sugar in urine and no other abnormality. He was fed on a high protein diet—protein 130 gm., fat 90 gm. and carbohydrate 200 gm. On an average the patient passed 1,700 c.c. of urine daily. On the fourth day he was fed 50 gm. glucose in a 50 per cent solution and the glucose tolerance test was done. The patient excreted no sugar in urine when fed glucose, showed a normal fasting blood sugar value and the glucose tolerance test was normal. Although the blood sugar level did not rise above 167 mg. per 100 c.c. blood, he excreted sugar at the end of the test. This indicated that he had a low renal threshold for glucose. He was then fed a high carbohydrate diet—protein 90 gm., fat 50 gm. and carbohydrate 300 gm.—for ten days. Glucose tolerance test was again normal and the urinary excretion of sugar was never more than 5 gm. daily. The vitamin C nutrition of the patient was then studied by estimating the urinary excretion of the vitamin both before and after feeding the patient with a daily dose of 600 mg. of synthetic ascorbic acid (70 mg. per kilo). Before feeding the patient excreted on the average 5 mg. of vitamin C daily and even 3 days after administration, there was no marked increase in vitamin C excretion. In normal individuals a high rise in the urinary excretion of the vitamin is obtained the next day after administration of the test dose. This indicated that the patient was suffering from hypovitaminosis C but he did not show any sign of bleeding gums, petechia, ecchymosis, anaemia, etc. At the time of discharge his weakness and frequency of micturition had disappeared although he was excreting 5 gm. of glucose daily.

Public Health Section

THE USE OF GROUND-NUT CAKE FLOUR FOR HUMAN CONSUMPTION*

By M. B. DAVER, M.B., B.S. (Bom.), F.R.F.P. & S.G.,
D.P.H. (Eng.), etc.

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DURING the last war and even to-day, the question of food supplies and of rice supplies in particular is the major problem for the country to solve. India is short of rice. Curtailment of transport facilities, hoarding and speculation have added to the difficulties. Therefore, it is essential to find out some other stuff which could be made available for human consumption with a view to meeting to some extent the cereal shortage. For this reason, the possibility of using ground-nut oil-cake flour, neat as well as mixed with flours or cereals and millets, was considered.

The use of neat flour was tried but had to be given up. The greatest obstacle was 'prejudices' against consuming the so-called 'food for animals' and the belief that it causes diarrhoea, though Dr. Simeons, Director of Public Health, Kolhapur, and Mr. Kincaid of American Presbyterian Mission, Kadoli, used the 'neat flour' in the market for sale; and their report was 'the response from the public was encouraging and they purchased it without any prejudice'.

Then we examined the possibility of using the flour in mixture with maize flour, because both these are articles not rationed and available in good amounts. We tried the mixture in proportion of 60 parts of maize flour and 40 parts of ground-nut cake flour for making various culinary preparations. Out of the flour, biscuits, halva, bhajiyas, ladoos, pakodas and chapatis and even loaves were prepared. These preparations were sold to the public during various exhibitions. The response from the public was excellent, there were no complaints. The public did not suspect that these articles contained ground-nut oil-cake flour.

Later on we made use of the flour in various institutions and boarding houses. The reports said 'there were no complaints on the grounds of taste or indigestion' and the preparations made out of the flour were liked by the inmates.

The flour was used even in most fastidious families for making chapatis and other preparations. They found that the preparations were as good as those made out of wheat or any

other cereal. The only difference was that they were sweetish in taste and therefore required addition of little more table salt.

Later on instead of maize flour we tried flours of cereals, millets or pulses according to their availability or taste. An advantage is that it can be used even in equal proportion; but we found that best proportion was 25 to 30 parts per 100 parts of mixture. In making loaves, it can be used only in 15 parts, if used in higher proportion, it becomes rancid.

From the analysis it is seen that ground-nut cake flour compares very favourably with wheat in its chemical constituents and is superior in vitamin contents, thiamine (B_1) being $12.5 \mu/g.$ and nicotinic acid $27.1 \mu/g.$

Its protein is of high biological value, almost similar to that of meat, besides it is rich in minerals. Thus, it would be an ideal addition to the Indian diets, as most of them are poor in proteins, mineral salts and vitamins, particularly B-complex. Its use can supplement to a great extent those constituents which are deficient in diets of those who do not take meat or egg.

Apart from general reluctance of the people to change their dietary habits, there are three main reasons why ground-nut cake has not hitherto been used for human consumption. First is its smell and second the belief that it causes diarrhoea, and thirdly the fact that they use it as food for animals and not for human consumption.

Its repulsive smell could be removed if only good, graded, selected and handpicked seeds are used. If the skin from the nuts is removed before putting them in the expeller, the cake is whiter in colour and has no smell.

In order to overcome the second difficulty, namely diarrhoea, the press should be used exclusively for ground-nut; it should not be used for pressing castor-oil seeds also.

To get rid of prejudices against its use—as in all other matters—propaganda and a little knowledge in nutrition will be enough. In spite of the additional expenses of picking, removing skin, etc., the flour could be obtained at four seers for a rupee.

This flour should be made popular and put on the market. If public takes to it, there will be proportionate savings in other rationed grains. It will serve three great purposes. Firstly, at cheaper rate the public will have the flour which is as nutritious as any other flour. Secondly, by its use there will be savings in rationed grains. Thirdly, our greatest object of turning the people to consume new food grains will be served.

* Read before the 34th Indian Science Congress held at New Delhi in January 1947.

The Indian Medical Gazette Fifty Years Ago

(From the *Indian Medical Gazette*, Vol. 32,
May 1897, p. 181)

MEDICAL REGISTRATION

AFTER a patient silence of years we return to the important question of the necessity for a *Registration Act* for India, an Act which might be and ought to be introduced without delay into all large towns, and which, after a fair trial, could be extended to provincial areas. We do not ask for any hasty or ill-considered laws, for the matter has already received grave, and in our opinion satisfactory, attention at the hands of the medical profession. If, however, the Government is not satisfied with the evidence before it, surely it would be possible to appoint an intelligent committee to sift the evidence already collected, to examine witnesses and to frame draft rules which could be subsequently shaped into an Act. The importance of this subject was recognized years ago, and in 1881, the medical profession in Bombay drew attention to their desire to have a *Medical Registration Act* for the town and island of Bombay. Their wishes were, in our opinion, on fallacious grounds entirely disregarded, but the Grant College Medical Society attacked the question again in 1887. The Calcutta Medical Society stimulated by the activity of the sister Society discussed the question at a meeting held on 13th July, 1887, and continued the discussion at subsequent meetings. A paper was read by Dr. Birch which gave a most exhaustive review of the situation and left no doubt in the minds of the majority that a very serious evil existed which could only be dealt with by legislation. It was pointed out that nothing existed to prevent the formation of so-called medical schools which pretend to teach medicine 'without dissecting room, library, museum, hospital, diagrams or appliances'. This statement, now ten years old, is true to-day, and is confirmed by the existence of such extraordinary institutions with high-sounding titles making a profit out of what can only be termed 'bogus' diplomas. There can be no doubt whatever that the medical profession, and we speak of both European and native medical men, has a right to demand some protection against unqualified and ignorant men who bring disgrace upon the science and art of medicine and surgery. In dealing with this question some consideration would have to be shown to the large number of unqualified practitioners, kobirajes, baidas and hakims at present plying their trade. They should, however, all be registered, and, after the passing of the *Medical Act*, new additions to their ranks would not be permitted. We need not stop to discuss whether there is any need for the existence of such persons. There is certainly no need for them in

the large towns to which this Act would first apply. Medical aid of a respectable and fairly reliable kind is now available in all large towns throughout India, and for the very poor there is always a hospital at which free medical attendance can be obtained. Surgeon-Colonel Ross in his *Triennial Report on Charitable Dispensaries* has called attention to the fact that 'anyone with a smattering of medical knowledge and even without it can and does set up as a private practitioner' in Bengal; and further that 'there is actually a so-called medical school in Calcutta which grants medical diplomas although it has no charter and is not even affiliated to the University or to any recognized medical institution'.

There are two interests at stake, both worthy of careful consideration. The interests of properly qualified medical men cannot be lightly passed over. When aspirants for medical qualifications learn that, after all their expenditure of time and money, they are on the same footing as the merest quack, their reflections are not likely to encourage others to follow in their footsteps. It is notorious that, so far as Government medical institutions are concerned, the supply of really good men is never equal to the demand. In the interests of the general welfare of the public the Government has a duty to perform and that duty is to give every one who is anxious and willing the means not only of obtaining a proper medical education, but also the means of earning an honest living, by protection against competition with ignorant and dangerous unqualified practitioners. The question affects not only natives and Europeans who have studied in India but also all European medical men who have come out from England and set up in practice in our large towns, and to a less degree all military medical officers whose appointments permit them to engage in private practice. It has been objected that the passing of a *Medical Registration Act* will not put a stop to 'quackery', nor will it prevent a certain minority of qualified men from engaging in disgraceful forms of practice. It would be futile to argue that any such perfect results would ensue. Punishment of offenders would however become easier and more certain. That these results follow the passing of such an Act may be gathered by anyone who will take the trouble to read the proceedings of the Medical Council in England, which are regularly published in the English medical journals. The question next requires consideration from the point of view of the general public. We think that no one will deny that the general public should be protected, as far as possible, from the dangers which accompany the existence of ignorant practitioners of medicine, and the only way to do this is to set forth clearly the diplomas and degrees which carry with them some guarantee that the possessor has been educated in a reliable school of medicine or university.

We have not space to recapitulate the details of the various discussions held upon the question of Medical Registration, but interested readers will find full information in the volumes of the *Indian Medical Gazette*, especially in the Medical Societies in the large cities of India and volume for 1887. We would suggest to the Indian branches of the British Medical Association the desirability of again raising this question with the view of obtaining a Commission of Inquiry, by whose opinion the Government might be guided as to the necessity for action, and the course to be adopted.

LONDON LETTER

THE subject of the excessive prevalence of venereal disease, especially of syphilis, in the European Army in India, continues to engage public and professional attention. A Departmental Committee was appointed in November last, by the Secretary of State for India, under Lord Onslow to report on the case. The facts set forth by this Committee have brought into view the magnitude and seriousness of the matter. 'Venereal disease', the report states, 'directly caused more than one-third of the total amount of sickness in 1895, 15 deaths and 348 invalidings, resulting in 130 cases in final discharge from the service; the constant and total disablement of 3,200 men out of a force of 71,000 men, and a vast amount of partial disablement and unfitness for any but routine duties. Indirectly, it increased the amount of sickness and invaliding under the head of many other complaints. The military efficiency of the army was most seriously impaired, and the increasing prevalence and intensity of contagious and inheritable disease among a body of 71,000 men, of whom many thousands are annually coming home to mingle with the civil population, was a growing danger to the health of the community. The Committee paid a visit to Netley Hospital, and found there a number of young men, disfigured, mutilated and incapacitated for life, whose terrible condition they describe in vivid terms. The Army Sanitary Commission has hitherto declared that the regulations issued and measures adopted under the Contagious Diseases Act in India exercised no repressive effect on the prevalence of venereal diseases in the European Army in India. The rapid and great increase of these maladies—especially of syphilis—since the discontinuance of these measures has convinced the Commission that they did cause a restraining influence, the increase arising during their continuance being due to other circumstances, such as the greater youth of the soldiers and the lower proportion of married men. The Commission has, therefore, strongly recommended resort to preventive arrangements. The Colleges of Physicians and Surgeons and the medical press, together with the more influential organs of the lay press have, with strong and open voice, spoken to the same purpose, and

numerous organizations are being formed to promote these movements; opposition is not wanting nor latent. Various individuals and associations are up in arms, and loudly remonstrate against the adoption of measures of any sort to repress these diseases as being wrong in principle and, as experience has shown, inutile in action. These views, which are not altogether the ravings of hysterical faddists, but also the convictions of earnest good men and women, are entitled to every respect; but a comparison with the case of our own army and that of continental armies demonstrates beyond doubt that repressive measures are efficient, and that the liberty to spread loathsome and dangerous disease, can be, as it undoubtedly ought to be, restrained. The opponents of repression rely too much upon figures which, as is well known, can be variously interpreted and used with plausibility to support opposite positions. The interpretation of these figures constitutes the foundation of much of the controversial writing which appears in the press; but, except as a measure and index of the large amount of disabling disease due to sexual vice, they are of not much administrative value. These totals are made up of a great number of sub-totals representing the state of particular places and bodies of men, and these sub-totals vary much in any one year or series of years, and also from year to year. It requires a special investigation and study of these variations and their causes to understand the case properly. This special inquiry has never been properly made, and it is not clearly known what degree of protection was really conferred by the preventive measures formerly in use according as they were carried out under favourable circumstances and efficiently or otherwise. At the first outcome of all this agitation the Secretary of State for India has sent to the Indian Government an important despatch in which the facts as regards the evils caused by venereal diseases in the army are forcibly stated, and instructions are conveyed that these maladies are to be treated as contagious diseases, the subjects of which, whether men or women, are to be subjected for purposes of segregation and treatment until they cease to be dangerous. The matter is to be worked on the principle of notification of infectious disease, and the manner in which this principle is to be reduced to practise which must depend on the conditions of the country and place, is left largely to military and civil authorities in India, acting under the guidance of the general indications laid down by the Secretary of State. I gather from a telegram published in this morning's *Times* that there is a feeling in India that the action taken by the Secretary of State is timid and inadequate. It may fall short of the requirements of the case looked at from a strictly hygienic point of view, but there are other considerations which a statesman has to take into account, and I am inclined to think that it was wise to proceed cautiously and

tentatively in the matter, and that in so delicate a subject as this is, precipitate and extreme proceedings would probably defeat their own object. Let us hope that the Government of India will be enabled by the present sanction to enact laws and rules which will materially reduce the suffering and disablement caused by these affections.

The Indian Medical Service is to hold its first dinner in London on the 20th of May. The movement has long been mooted; but until this year no opportunity has been offered to members of the service retired and on leave of meeting together socially and spending a pleasant evening in each other's company.

Other services and interests assemble annually in this matter, and the wonder is that the Indian Medical Service has not long ere now instituted a function so popular and useful in this country. A great many men have already signified their intention of joining in the excellent project, and the Indian Medical Service Dinner of 1897

promises to be an unqualified success; and will, I hope, be the commencement of one unbroken series. Sir Joseph Fayrer, Bart., is to preside.

The second volume of Dr. Clifford Allbutt's System of Medicine has just made its appearance. It contains abundant material which ought to be of interest and use to Indian medical practitioners. The articles appear to me to be well written and quite up to date. I am surprised that the *Indian Medical Gazette* has not presented its readers with a review of the first volume which appeared some time ago. The work will take its place as a worthy successor to the late Sir Russell Reynolds' system which in its day had a great reputation and sale. Medical science advances rapidly in these days, and it has been found necessary to append to the present volume important information regarding typhoid fever, plague and yellow fever, which has accrued since the publication of the first volume.

Current Topics, Etc.

Progeria with Nanism and Congenital Cataracts in a Five-Year-Old Child

By R. C. MOEHLIG

(Abstracted from the *Journal of the American Medical Association*, Vol. 132, 16th November, 1946, p. 640)

A CASE of progeria with nanism and congenital cataracts was observed in a five-year-old boy. Progeria with nanism and cataract is not unusual in Werner's syndrome of the adult, but the association of cataracts is a rare condition as a congenital defect. The child was born prematurely and at birth weighed 1,366 gm. His growth was retarded. The cataract of the left eye disappeared spontaneously when he reached the age of 3 years. He was mentally retarded but even at the age of 3 had an unusual talent for music. Methyl testosterone 10 mg. was given in daily doses which resulted in an increase of 17.8 cm. in height and 5 kg. in weight within a period of eight months.

Disseminated Pulmonary Calcification

By ROBERT H. HIGH

HENRY B. SWERLING

and

MICHAEL L. FURCOLOW

(Abstracted from *Public Health Reports*, Vol. 62, No. 1, 3rd January, 1947, p. 20)

DURING the roentgenological survey of various population groups, scattered calcifications in the pulmonary parenchyma have been detected. Some of the army recruits in U.S.A. have been rejected on this score. Hitherto such areas of calcification were considered to be due to healed hematogenous foci of tuberculosis. X-ray studies of groups in the general population have shown distinct geographical differences in the distribution of pulmonary calcification. Further pulmonary calcification has been found frequently in tuberculin negative individuals. But during the last two years a number of papers has appeared in the U.S.A. (*U.S. Public Health Reports*, volumes 60-62) which suggest a mycotic etiology for a large proportion of these cases.

Immunological reactions have been tried with histoplasmin, blastomycin, coccidioidin and haplosporangin. A dependable technique has been evolved by Emmons, *et al.* of the National Institute of Health for the preparation of histoplasmin, whereby non-specific reactions have been largely avoided. Histoplasmin is a sterile broth filtrate of a 5-7 months' culture of *H. capsulatum*. 0.1 c.c. of a 1/1,000 dilution of the filtrate is given intradermally and the result read after 48 hours, indurations of a diameter of 5 mm. and above being considered as positive.

Histoplasmin and tuberculin tests, in addition to chest skiagraphy, have been carried out on different population groups in different parts of the United States. For the benefit of our readers we shall try to give a summary of some of the findings.

These calcifications are more commonly found in the central eastern region, particularly in and near Kansas city. The histoplasmin rate was found to be much higher than tuberculin rates, the whites showing a higher rate than Negroes. In a group of Kansas school children, 12.7 per cent showed definite or probable pulmonary calcification. Among those positive to both histoplasmin and tuberculin, 23.8 per cent showed calcification. Among those positive to histoplasmin but negative to tuberculin, 26.4 per cent; and among those negative to histoplasmin but positive to tuberculin, 11.4 per cent. In the group who were negative to both histoplasmin and tuberculin only 2.6 per cent had calcification. The rate of calcification rises from 4 per cent in the age group 4-6 years to 18 per cent in the age group 16-18 years. In another series studied by High *et al.* (*U.S. Public Health Reports*, volume 62, 3rd January, 1947) noted two types among 113 cases of disseminated pulmonary calcification, *viz.*, a milinary type and a multiple asymmetrical bilateral type. These workers observed that (1) the frequency of calcification rose among the whites from none in the age group under 4 years to 10 per cent in the age group 16-18 years, (2) Negroes showed less calcification than whites, (3) a definite familial relationship was noted, (4) in no instance was such calcification noted among those who reacted only to tuberculin; but in 93.5 per cent of the group, disseminated calcification was noted among reactors to histoplasmin alone.

A. C. U.

THE USES OF VITAMIN E

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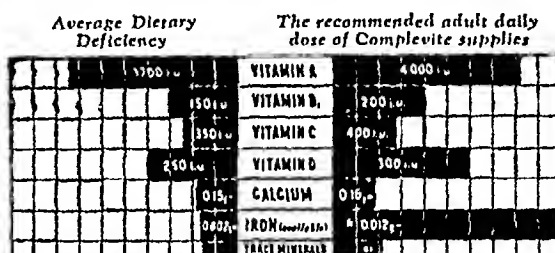
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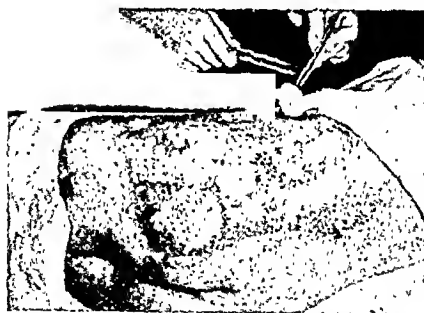


Fig. 1



Fig. 2

CASE HISTORY—The patient, a young man, was admitted to hospital, having been burnt by an electric blanket. The raw area measured 162 square inches. Excision of the burnt area was performed on the same day. Tulle gras (Jelonet) was applied. Fixation by Gypsona plaster of paris bandages applied over the whole area, abdomen and thigh. The patient was given a blood transfusion. Seven days later, the affected part was covered with thin razor grafts from both thighs and a pressure dressing of Elastocrepe applied. Fixation was again secured with Gypsona plaster of paris. The patient was discharged to duty 7 weeks later.

The details and illustrations above are of an actual case. T. J. Smith and Nephew Ltd., Hull, England, manufacturers of Elastoplast, Elastocrepe and Jelonet, are privileged to publish this typical instance of the use of their products with success in the belief that such records will be of interest.



Fig. 3

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BM/33

Recent Advances in the Treatment of Epilepsy

By H. HOUSTON MERRITT, M.D.

(Abstracted from the *New York State Journal of Medicine*, 1st December, 1946, p. 2633)

GREAT advances in the treatment of patients with epilepsy have been made in the last decade. The introduction of a new drug, phenytoin sodium, for the control of grand mal seizures has restored many epileptics to their normal place in life and the use of tridione has appreciably decreased the frequency of petit mal attacks in children. A new interest in the treatment of epilepsy has been awakened and it is very probable that more efficient anticonvulsant drugs will be discovered in the near future.

Recent Advances in Rh Testing

By SOL HABERMAN

and

JOSEPH M. HILL

(Abstracted from the *International Medical Digest*, Vol. 49, No. 5, November 1946, p. 260)

IF a potent antiserum of the proper specificity is available the detection of the Rh antigen is a relatively simple procedure. In a series of 1,000 comparative tests between the test tube method and the capillary method of typing, the Chown capillary test showed the same specificity and a greater sensitivity than the tube method.

The anti-human globulin serum is an important serological adjunct to the investigation of iso-immunization whether by pregnancy or transfusion. When the incomplete or blocking antibody is adsorbed on Rh positive erythrocytes, no observable agglutination occurs but the cells are coated with the anti-Rh globulin. The action of this serum is to develop an observable agglutination where the specifically adsorbed antibodies fail to do so. Because of the analogy to the photographic development of a visible image, the writers have suggested that the term 'developing serum' be applied to the anti-human globulin serum.

The following methods for Rh testing are described :
Test for agglutinins.—A 2 per cent suspension of a suitable O Rh positive cell is prepared. One drop of these erythrocytes is mixed with 1 drop of patient's serum in a tube. The tube is placed in a 37°C. water bath for 1 hour. After incubation, the tube is then centrifuged lightly for 1 minute. The tube is lightly agitated and observed under the lower power of the microscope. If clumping occurs, agglutinins are present.

Blocking test for agglutinins.—If the above test shows no clumping, 1 drop of anti-Rh typing serum of known potency is added to the erythrocyte suspension. The tube is again incubated at 37°C. for 1 hour. At the end of the second incubation the cells are observed for agglutination. If clumping occurs, the serum of the patient possessed no blocking antibodies. If no clumping occurs, the patient's serum contained blocking antibodies.

Developing test on patient's serum.—One drop of the serum to be tested is mixed with 1 drop of a 2 per cent suspension of type O Rh positive erythrocytes in a Kahn type tube. This is incubated as before. If no clumping is observed the cells are washed three times. One drop of developing serum is added to the sedimented cells after the saline has been removed. The cells are suspended and incubated for 1 hour at 37°C. The tube is then centrifuged and observed for clumping. Agglutination indicates the presence of adsorbed immune globulin.

Developing test on erythrocytes.—The erythrocytes of cord blood are suspended in saline solution and washed three times and made up as a 2 per cent suspension. One drop of the suspension is added to

1 drop of developing serum in a tube and incubated at 37°C. for 1 hour, centrifuged and observed for agglutination. Clumping of the erythrocytes indicates that antibodies had been adsorbed *in vivo*.

Studies were made on the serum of 5 mothers who had given birth to children having erythroblastosis. In case 1 the agglutinating titre of the maternal serum was very weak and no blocking antibody was demonstrated. However, the developing test showed a titre of 1:64. The cord cells showed a 4+ reaction. In case 2 no agglutinins were found but a blocking titre of 1:2 was present. The developing titre was 1:16. The cord cells were not available because the case was referred from another hospital. In case 3 the mother of a hydrops foetalis showed only 1:2 agglutinating and 1:32 blocking titre in the serum. When the developing test was used her serum showed a titre of 1:2,048. In case 4 the agglutinating and developing titres were equal (1:128) but no blocking antibody was observed. The cord cells showed a 4+ reaction. In case 5 a very weak agglutinin in the undiluted maternal serum was found, but no blocking was observed. The developing titre was 1:64. In this case the cord cells gave a 3+ reaction. In all the cases presented the developing titre equalled or exceeded the agglutinating or blocking titres.

The developing test was applied routinely on all deliveries, and in a period of 62 consecutive days, 424 cord bloods were studied. There were four cases of erythroblastosis, 15 still births, and 1 case of atelectasis. The case of atelectasis is of interest in that the child's blood showed 50 erythroblasts and 20 normoblasts per 100 white blood cells, thus showing one of the laboratory findings associated with erythroblastosis foetalis but due to another cause, e.g. oxygen want. The developing test on cord red blood cells was positive in all the cases with erythroblastosis and negative in the remaining cases of the series.

A. B. R. C.

Penicillin Treatment of Trachoma A Preliminary Report

By D. J. DARIUS

(Abstracted from *Tropical Diseases Bulletin*, Vol. 43, No. 12, December 1946, p. 1182)

DARIUS reported 12 cases of trachoma ranging from type I to the chronic type III treated at the United States Indian Service Hospitals with drops of sodium salt of penicillin in a solution of 500 units to each cubic centimetre of water every $\frac{1}{2}$ hour and 3 hours. Improvement was observed under the three-hour schedule but more rapid results were obtained under a half-hour schedule. Loss of photophobia and lacrimation was noticed in twenty-four to forty-eight hours. Improvement in vision was usually evident on the third day. Beginning shrinking and retraction of vessels of the pannus was definite on the fifth to the seventh day, with accompanying slower clearing of the grey corneal pannus infiltrate. Rapid healing of complicating corneal erosions and ulcers was the most spectacular improvement. The effect is not superior or more rapid than that obtained with sulfanilamide therapy, but penicillin may offer a solution in the treatment of sulfanilamide resistant or sensitive cases.

Siderocytes in Mammalian Blood

Proc. Roy. Soc., Ser. B. 1946, 7th August, y. 133, No. 872, 235-48, 7 figs. (21 refs.)

(Abstracted from *Tropical Diseases Bulletin*, Vol. 43, No. 12, December 1946, p. 1164)

'1. THE siderocyte appeared in large numbers in stored blood and in blood that has been treated with certain chemical agents, e.g. phenylhydrazine.

2. Apparently all erythrocytes went through a stage as a siderocyte, but the granules were extruded, leaving

a cell which was morphologically indistinguishable from a pre-siderocyte erythrocyte.

3. As siderocytes have now been demonstrated in mouse, rat and man (Gruneberg, 1941a, b); in guinea-pig, horse and rabbit (Granick, 1943) and in cat and dog (Case, 1943), the cell is probably to be found in all mammals.

4. After an erythrocyte had become a siderocyte it became susceptible of phagocytosis, and was removed from the circulation in the intact animal.

5. The stainable non-haematin iron was derived from a special fraction of the haemoglobin. Therefore, the iron should be regarded as catabolic, and closely associated with, if not identical with, the E.S.I. described by other workers.

6. The siderocyte is probably the source of the urinary siderotic granules described by Rous (1918).

7. The siderocyte probably has importance in clinical medicine.

A. B. R. C.

Bovine Plasma for Transfusion

(Abstracted from a letter written by J. H. Massons, published in the *Lancet*, 15th February, 1947, p. 272)

THE writer (J. H. Massons) replied to the annotation by Editor, the *Lancet*, on bovine plasma and the letters of Mr. Edwards and Mr. Hughes.

Colloid osmotic pressure.—The annotation suggested that the osmotic pressure of prepared calf plasma (P.C.P.) is less than that of human plasma. With this Mr. Edwards agreed, while Mr. Hughes thought that heating will increase the osmotic pressure. Through lack of suitable apparatus the writer had been unable to follow the changes in osmotic pressure during the preparation of P.C.P.: clinically P.C.P. seemed to exert sufficient osmotic pressure to remain within the vessels, and its administration in hypoproteinaemic oedema is followed by diuresis. Without doubting Mr. Edwards' statement that plasma treated by his method and heated to 100°C. loses its osmotic pressure, the writer suggested that his method differed from Mr. Edwards in the amounts of formal and ammonia added, and it would be interesting if Mr. Edwards' experiments were repeated using the writer's method of preparation.

Antigenic properties.—From Mr. Edwards' letter and paper, heating to 100°C. appeared unnecessary, since agglutinins and haemolysins were inactivated at 72°C. Some antigenic properties were retained after heating at this temperature. With formalized calf serum heated only at 72°C. it was possible to induce fatal anaphylactic shock in guinea-pigs, and to bring about anaphylactic reactions in man. Mr. Edwards did not report any anaphylactic accidents probably due to the fact that few of his patients received more than one transfusion of his bovine serum. Had he been treating patients requiring repeated transfusions at intervals of 5 to 7 days, he might have observed typical anaphylactic crises, and obtained positive Prausnitz-Kustner tests.

The writer was certain that, while hypersensitiveness to repeated injections of bovine plasma heated only to 72°C. is frequent, more than 1,000 ampoules of P.C.P., many of them given at intervals to the same patients, had never produced a reaction of an undoubtedly anaphylactic nature: one reaction encountered was due to sensitiveness to formal. He thus feels justified in stating that P.C.P. is not antigenic.

Fate of P.C.P.—The fate of P.C.P. in the body is not known. Occasionally slight albuminuria (sulphosalicylic acid test), lasting a few days, had been seen after its administration. It is considered probable that most of it was metabolized in the body.

Toxicity.—Mr. Hughes added to the criterion 'non-toxic' a further criterion, the absence of the syndrome attributed to macromolecular substances, such as gum acacia. The point was not investigated but children, who had received multiple transfusions of

P.C.P., recovered uneventfully, and rabbits given repeated injections of P.C.P. (10 c.c.m./kg.) over many months at intervals of 5 to 7 days, remained in normal health. The production, in these rabbits, moreover, of antibodies to injected red cells from *Macacus rhesus* was unimpaired.

Animal plasma as a substitute for human plasma.—It is too ambitious to suggest as in the annotation that an acceptable plasma substitute must be as innocuous and as effective as plasma itself. Because of its cheapness and ease of preparation, it can be of great value to doctors in those countries where there are no transfusion services.

Allergic Reactions to Penicillin

By A. I. SUCHECKI, M.D. (Paris)

(Abstracted from the *British Medical Journal*, 21st December, 1946, p. 938)

REPORTS on allergic reactions to penicillin are increasing in number. Evidence is accumulating that the offending agent is the active principle of penicillin.

Thirty-eight cases of allergic reactions to penicillin have been collected from the literature and reviewed.

Nine personal cases are added, of which 4 presented hydrarthrosis, 2 urticaria, and 3 serum-sickness-like reaction due to parenteral administration.

Local use of penicillin will give rise predominantly to contact or sensitization dermatitis, while parenteral administration will produce immediate or delayed reactions classed as (a) allergic hydrarthrosis, (b) urticaria, (c) simulating serum sickness, and (d) anaphylactic-shock-like syndrome.

The frequency of these reactions to parenteral penicillin has been put at varying figures between 0.56 per cent and 5.7 per cent. The former is probably nearer the truth.

So long as penicillin remains unsynthesized a categorical answer as to whether the reaction is due to impurities or active principle is impossible. The search for specific serum antibodies has so far given no convincing results. All that is known is that a small number of people are susceptible to penicillin sensitization, and that this susceptibility is greatly enhanced in the presence of skin infections, especially those due to a fungus. Previous penicillin treatment, parenteral or local, can predispose to allergic reactions. Some of these may be very severe and call for cessation of treatment; attempts at desensitization have been made by some workers. O'Donovan and Klorfajn successfully desensitized one of their patients by repeated oral doses of penicillin.

Skin tests have given variable results; the patch test is easy to perform and is frequently positive. Dr. P. Headon suggested dry powdered penicillin on a square of gauze applied to the skin of the chest or arms. In case 5 a positive result was obtained two hours after application, the patient complaining of itching in the right hand and swelling of the lips. The test was also positive in case 4, in which it was performed at the time of recovery; the same patient had a negative intradermal test. Adrenaline hydrochloride hypodermically and ephedrine orally gave rapid relief. These drugs should be repeated at frequent intervals in conjunction with small doses of phenobarbitone. 'Benadryl', the new anti-histamine drug, may be found useful in the treatment of manifestations of penicillin hypersensitivity, especially in cases with marked urticaria.

What should be done if penicillin is again indicated in a case with a history of extensive urticaria following previous penicillin treatment with subsequent recovery? Most observers are of the opinion that the drug should not be withheld if it is considered important to the treatment. The patient should be watched, and if an unusually severe reaction occurs, cessation of penicillin will have to be considered. No useful purpose is served by changing to another commercial batch. Dr. A. E. Shaw suggested the use of skin tests to discover susceptible individuals, especially

among those who have had (a) penicillin once or more previously; (b) a history of allergy, such as asthma, migraine, hay-fever; (c) fungus infection; (d) sensitization *eczemas*. Unfortunately skin tests are often negative in obviously allergic patients, and one wonders whether a preliminary injection of, say, 15,000 units, would produce a clear-cut and mild enough reaction to indicate a penicillin reactor.

A. B. R. C.

Fatal Use of a Dangerous Universal Donor

(Abstracted from a letter written to the *Lancet*, 8th February, 1947, by DOUGLAS McRAE, Director, Blood Transfusion Service, Edinburgh and South-East Scotland Region)

It is to be hoped that all clinicians who order or give a blood transfusion will appreciate the importance of abhorring the use of the term 'universal donor'. As group-A and group-O people are, roughly speaking, numerically equal, if patients were grouped before transfusion, the demands for A and O blood could be made nearly equal; people of groups B and AB can of course be used to provide plasma. With donor panels decreasing in most regions, the urgent need for group-to-group transfusion cannot be too emphasized.

I think it is a pity to suggest that direct compatibility tests can be omitted even 'where urgency is too extreme to permit of such a test'. Surely the patient can and should be saved temporarily by the use of plasma until correctly matched blood is available. As an aid to routine compatibility tests in those patients who may require blood urgently (*e.g.* severe post-partum haemorrhage), it should be an automatic procedure that when a woman goes into labour, a specimen of her venous blood is withdrawn into a sterile tube. Her serum is then available for the direct compatibility test should she require blood.

A. B. R. C.

Otic Complications of Streptomycin Therapy A Preliminary Report

By EDMUND P. FOWLER, Jr., M.D.

and

EWING SELIGMAN, M.D.

(Abstracted from the *Journal of the American Medical Association*, Vol. 133, No. 2, 11th January, 1947, p. 87)

It is evident that a high incidence of vestibular disturbance and a number of cases of deafness, either transitory or permanent, will occur with the use of streptomycin of even the best current manufacture if large doses of the drug are given over prolonged periods.

It is hoped that it can be proved that the toxic symptoms are caused by impurities in the drug.

Fortunately patients seem to recover from deafness in the majority of cases, and even if the caloric response remains negative, the accessory balance mechanisms compensate marvellously for totally dead labyrinths, so that this need not be feared. In fact, the vertigo usually lessens even if the therapy is continued in spite of it.

The mechanism of the otic complications of streptomycin therapy is not clear. The cause could be either a labyrinthine or retrolabyrinthine lesion. Examination of pathologic material to date from the brains of dogs and human beings has failed to show any lesion attributable to streptomycin in the auditory tracts. Satisfactory temporal bone material is not yet available for study.

Eighty-one streptomycin-treated patients were examined for evidence of aural toxicity.

Two months after the cessation of therapy 3 of these patients showed an absence of vestibular response. During the third month after therapy 1 of these 3 has

shown increasing recovery of response. All 3 complained spontaneously of dizziness during treatment.

Another patient showed a severe loss of hearing two weeks after treatment. One month after treatment he had shown decided improvement in hearing. He had a normal vestibular response throughout.

The occurrence of otic symptoms during streptomycin therapy should call for a reconsideration of the case before continuing the administration of the drug. If streptomycin therapy is continued, the drug with another manufacturer's lot number should be tried.

An audiogram and vestibular test should be performed before the initiation of streptomycin therapy.

The low tone and high tone losses here reported are probably not due to streptomycin except in 2 cases. The low tone losses are probably due to outside interference. The losses in high-pitched tones relatively unimportant in the hearing of speech are the type commonly found in soldiers who have served in active combat.

A. B. R. C.

Cancer Treatments from Russia

(Abstracted from the *Journal of the American Medical Association*, Vol. 133, No. 2, 11th January, 1947, p. 111)

THE KR treatment (*U.S.S.R. Information Bull.*, 6:2, Oct. 23, 1946) named after its originators Nina Klyucva and Georgi Roskin, is now being tested in the treatment of human cancer in Moscow, Russia, by Trutnev, Lyampert and Egorov. The method is said to have little effect in cancer of the skin but to show promise in cancer of the throat, uterine cervix and breast. The preparation is made from dead protozoa of the species *Trypanosoma cruzi*. The material is said to localize in tumours and destroy them. In a second release (*Ibid.*, 6:12, October 23, 1946) from the Russian Embassy there is a brief mention of another method said to be based on observations by Besredka. He found that a certain degree of immunity sometimes developed to transplanted tumours in animals when the transplants were made intracutaneously. Krashennnikov used the method in 2 cases of human gastric cancer and 2 in which the type of primary tumour is not stated. He excised 1 to 2 gm. of cancer tissue, wrapped it in a piece of omentum and transplanted it under the skin of the abdomen. It is stated that the transplant resolved promptly, as did also the primary tumour. It was believed that the transplanted cancer played the rôle of an autovaccine. The function of the omentum, presumably, was to supply cells for the fabrication of immune bodies.

A. B. R. C.

Hedblom's Syndrome

(Abstracted from the *Medical Press*, No: 5613, 4th December, 1946, p. 414, under Current Topics)

THAT many of the symptom-complexes met with in everyday practice are 'missing' from the orthodox treatises on systematic medicine is a commonplace to the family practitioner.

Recently the writer has encountered three cases of 'acute primary diaphragmatitis'. The clinical picture, as described, includes inspiratory pain (ponopnea) on the affected side, limitation of mobility of the lower chest wall, and a tendency to a flaring out of the lower costal margin with each inspiration. Pain in the right or left upper quadrant of the abdomen with associated muscle spasm may be found. Pain in the homolateral shoulder and the trapezoid ridge may be complained of by the patient. X-ray appearances show a tendency to raising of the involved diaphragmatic leaf; mobility may be diminished or absent. The severity of these symptoms is variable. Treatment has been primarily symptomatic. Sedatives and

physical therapy have been employed. Opiates may be necessary to relieve the intense pain.

The disease is self-limited, but may have a tendency to recur. The attacks may follow a 'cold' coming on with a change in atmospheric temperature.

A. B. R. C.

Cheese Rash

(Abstracted from the *Medical Press*, No. 5613, 4th December, 1946, p. 414, under Current Topics)

AFTER treating a man for corneal ulceration and a diplococcus infection by penicillin instillations, it was found that he developed a severe reaction. Penicillin ointment was then substituted; again he had a definite reaction. Two injections of 15,000 units of penicillin provoked a severe generalized rash over the body.

A month later he ate Roquefort cheese containing some of the mould. He developed the same kind of rash.

Some of the moulds in Roquefort cheese belong to the penicillin group, but since penicillin is a product of the metabolism of the mould, it is not known whether there are cross reactions between penicillin and the mould itself. The case recorded may have been an example of penicillin activity by mouth.

A. B. R. C.

Drowsiness from Benadryl

(From the *Lancet*, ii, 30th November, 1946, p. 800)

THE drug 'Benadryl' (B-dimethylaminoethyl benzhydryl ether hydrochloride) has anti-allergic properties and also an anti-histamine action which enables it to relieve spasm of smooth muscle. It is given by mouth in capsules of 50 mg., the average adult dose being one to four capsules daily. It has been used with great success in urticaria, angioneurotic oedema, erythema multiforme, and hay fever; and Wilcox has shown that the urticaria which occasionally follows penicillin therapy also responds well. It is not, however, without toxic effects, the most prominent being drowsiness; and Slater and Francis describe a case in which an accident resulted from this symptom. A hay-fever patient took a 50 mg. capsule of benadryl at 7 a.m. and complained of feeling drowsy on starting work at 8 a.m. An hour later, while driving an electric platform cargo truck, he lost control and jumped off the truck. He was not hurt, but the truck ran off the platform and was wrecked.

More than half the patients taking benadryl notice slight drowsiness, and a few sleep for anything up to 18 hours at night, though this effect usually wears off in a day or two. When drowsiness is severe the dose may be reduced to 10-20 mg. A possible alternative would be to give amphetamine ('Benzedrine') in doses of 5 or 10 mg. at the same time. In the treatment of epilepsy it has been found that large doses of phenobarbitone (e.g. gr. 3 daily), which alone produce intolerable drowsiness, will still have the same effect on the fits if given in conjunction with amphetamine, though their hypnotic action is much reduced.

Mepacrine Rashes

(Abstracted from the *British Medical Journal*, ii, 14th December, 1946, p. 907)

DURING the recent war a number of puzzling dermatological problems arose in those theatres where mepacrine was employed in the prophylaxis or treatment of malaria.

The syndrome has certain distinctive features, among which are the pigmentation and lichenoid changes. It tends to affect seborrhœic sites, but readily progresses to a general affection, with secondary sepsis and ulceration, and it runs a protracted course. Irritation is not

a marked feature of the condition. It includes the following three types of reaction, and though all stages may be seen in the same patient, the lichenoid and generalized eruptions commonly follow the patchy eczematoid. (1) The patchy eczematoid type accounts for 30 to 40 per cent of cases; the hands and feet, groins, eyes and ears are the sites of election. (2) The hypertrophic lichenoid type may arise as such primarily but usually follows the former type. Spread is rapid, and the appearances resemble a very severe and unusually extensive chronic hypertrophic lichen planus. Mucous membranes are involved, as are the scalp and the face. The latter is rarely attacked in true lichen planus. A peculiar bluish-grey pigmentation occurs. The typical polygonal papules with flat, shining surface are absent, and the glans penis is not affected. (3) The generalized exfoliative type usually follows upon the eczematoid or lichenoid. If it is a primary occurrence it may be acute and oedematous and cause pyrexia.

The patients are ill and unfit for duty, are in hospital for an average period of three and a half months after being evacuated from the tropics, and may not recover for six to twelve months. Pigmentation may be very persistent and in some cases a fine reticular atrophy is seen. Hair and nails were often shed, but they grew again in all cases observed. No drug therapy proved of value except penicillin for the secondary sepsis that was a frequent complication.

The incidence of this adverse response to mepacrine was not sufficiently high to justify withdrawal of the drug from general use, but those subject to the disturbance, could not subsequently take the drug without relapse of the dermatosis. They had therefore to be withdrawn from those areas where prophylactic measures against malaria were necessary.

Tropical Ulcer Healing Under Lead Foil

(Abstracted from a correspondence written by H. M. FISHER, L.D.S., the *East African Medical Journal*, Vol. XXIII, No. 12, December 1946, p. 393)

It has been suggested by Dr. H. M. Fisher, L.D.S., that tropical ulcers like veldt sores and abrasions do not heal due to exposure of the ordinary dressed wound to the sun's rays and he suggested the trial of using a layer of lead foil between the dressing on the wound and the elastoplast holding it in position.

A. B. R. C.

Chemotherapy of Virus Diseases

(Abstracted from a letter from M. H. GORDON published in the *British Medical Journal*, 15th February, 1947, p. 266)

THE writer agrees with Dr. W. N. Leak's letter (25th January, p. 160) protesting against the statement in the leading article of 7th December, 1946, that there is scarcely a hint that viruses are susceptible to chemotherapeutic attack. In the case of both vaccinia and smallpox viruses there is definite evidence that they are extremely susceptible to the action of potassium permanganate, which inactivates them even when diluted to 1:100,000. This was described and illustrated in the Medical Research Council's Special Report, Series No. 98, 1925. During an outbreak of severe smallpox in the Sudan the cases had been treated with compresses soaked in permanganate and applied to the skin lesions with amazingly successful result. Balfour saw at the time that something more than to counteract any secondary infection must be involved to account for the beneficial effect. When he read the report in question and realized the high degree of susceptibility of smallpox virus itself to permanganate, Balfour was more delighted than the writer ever remembers to have seen him. The pronounced viricidal action of permanganate on vaccinia virus *in vitro* ceases in the presence of glycerine. The well-established

value of glycerine in conserving viruses is due to the protection it affords at their weakest point—hypersensitivity to oxidation. Bacteria are far more resistant to permanganate than viruses.

A. B. R. C.

Wood's Light Fluorescence Phenomenon in Quinacrine Medication

By J. E. GINSBERG

and

P. L. SHALLENBERGER

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 6th July, 1946, p. 803)

As the result of the extensive use of quinacrine hydrochloride (atabrine) as an antimalarial drug during the war, its pharmacologic properties have become well known and have been discussed thoroughly in the literature. Temporary yellow discoloration of the skin and certain types of associated skin reaction, including bluish pigmentation of the nails and palate, due to the prolonged use of atabrine as an antimalarial prophylactic, have also been reported and observed by army physicians.

It is well known that atabrine when given orally accumulates in the tissues and is slowly excreted from the body. When its use is discontinued, excretion continues for long periods. Our present discussion shows that it is still present in the nails a year or more after regular oral ingestion of the drug has been stopped.

The present study was accidentally inspired by one of the authors (J. E. G.), who had recently spent almost two years as an army physician in the tropics) when he noticed a bright greenish yellow fluorescence of his own fingernails while examining a child for tinea capitis under Wood's light in his office. The other author (P. L. S.) had also noticed similar fluorescence to ultraviolet light while making a previous study of deposits of atabrine in the hard palate and fingernails.

OBSERVATIONS ON 511 GENERAL HOSPITAL PATIENTS OF ALL TYPES AND DEDUCTIONS

1. Patients still on atabrine antimalarial prophylaxis or those on atabrine therapy showed the characteristic greenish yellow fluorescence of all the nails under Wood's light all the way to the cuticle.

2. Those who had not taken atabrine for a month or more showed normal pearl white fluorescence in the proximal nail with greenish yellow fluorescence distally. The pearly white area corresponds to the nail growth in this period.

3. The proximal clearing was apparent in the fingernails before it appeared in the toenails after atabrine was discontinued.

4. Atabrine fluorescence tended to disappear entirely from the fingernails three to six months after the drug was stopped. In the hands, the nails of the thumb and forefinger tended to lose the fluorescence last. In the fingernails of one patient, however, the atabrine fluorescence was present in the nails of the ring fingers and toes only four months after discontinuing atabrine.

5. Atabrine fluorescence usually did not disappear from all nails until about one year after the drug was stopped. The great toenails frequently remain fluorescent several months longer than the others.

6. Studies of women's nails were in general unsatisfactory, because of staining from nail lacquer present or recently applied.

7. Subjects who had taken only small quantities of atabrine did not show the characteristic atabrine fluorescence phenomena.

8. Definite fluorescence of the nails was apparent in all subjects who were on atabrine therapy or sound prophylaxis when examined or who had discontinued using the drug within a six-month period.

Amyloid Macroglossia (Report of a Case)

By MARGARET D. BABER, M.D. (Lond.), M.R.C.P.
(Abstracted from the *Lancet*, 8th February, 1947, p. 210)

A CASE of association of macroglossia with amyloidosis was described. Patient, aged 63 years, gave a history of six weeks' dysphagia, the difficulty in swallowing being greater for solid than for liquid food, and giving an impression of food lodging in the throat. There was no pain. Radiography of the spine showed only senile osteoporosis of the vertebrae.

Physical examination showed a pale wasted dehydrated man. His speech was thick and indistinct, but his voice was not hoarse. His tongue was enlarged in all dimensions but did not fill the mouth completely. It was strikingly immobile, furred, and dry, and felt uniformly hard. No ulcer was seen.

The submaxillary glands were slightly enlarged but not hard, and there were several palpable glands of the same consistence in both anterior triangles of the neck. The sternomastoid muscles felt curiously indurated, but movements of the neck were not appreciably limited.

Laryngoscopy showed an oedematous type of swelling in the subglottic region, but no ulceration. Wassermann reaction negative. Radiography of the chest showed senile changes only.

A barium swallow suggested a filling defect in the upper end of the oesophagus.

After an unsuccessful attempt in introducing the oesophagoscope the patient died of coronary thrombosis as found in the necropsy. The whole tongue appeared to consist of pale homogeneous tissue, the cut surface of which, when stained with iodine, gave the mahogany colour typical of amyloid disease. The oesophagus formed a rigid tube, and its cut surface gave the same reaction with iodine. The other organs were not remarkable, except that the gall-bladder contained 'mixed' stones and inspissated pus. The liver, spleen, and kidneys appeared normal macroscopically.

The tongue, oesophagus, buccal mucosa, sternomastoid, and heart showed typical amyloid tissue, staining well with methyl violet. Apart from a few deposits of amyloid material in the glomerular tufts of the kidney, the liver, spleen and kidney were normal.

Amyloidosis with macroglossia appears to be a different condition from the classical form of amyloid disease due to protracted suppuration, tuberculosis, syphilis, Hodgkin's disease, etc. Unlike the latter, the amyloidosis has no predilection for liver, spleen, kidneys, and intestinal mucosa. On the contrary, these sites are completely spared or only slightly affected, and the main deposits are found in the tongue, skeletal muscles, and heart. Sometimes the skin, lungs and upper intestinal tract are involved also. None of the acknowledged causes of amyloid disease had been observed in cases of so-called atypical amyloidosis. In the case described the presence of pus in the gall-bladder was not likely to be relevant, since this is a fairly common lesion not recognized as associated with amyloidosis.

Unfortunately this case threw no light on the obscure aetiology of the condition.

A. B. R. C.

Distribution of Blood-Groups

(Abstracted from the *Lancet*, ii, 20th July, 1946, p. 94)

DURING the war G. L. Taylor and his co-workers examined the blood-groups of 190,000 people, mostly in the R.A.F., who were drawn from all over the United Kingdom. They also examined Belgian, Czechoslovak, Dutch, French, Polish, and Turkish—though the numbers were small. The findings have now been published by Dobson and Ikin. The distribution of blood-groups among the 190,000 R.A.F. men, which can be taken as representative of the distribution

for the United Kingdom, was : group O 46.7 per cent, group A 41.7 per cent, group B 8.6 per cent, and group AB 3.0 per cent. The incidence of abnormalities was very small. Thus cold agglutinins were detected in 61 persons, and in 15 cases (3 of group O, and 12 of group A) there was deficiency or complete absence of anti-B agglutinin; in only one case (group O) was anti-A agglutinin completely absent. These figures differ little from those already known, such as those recorded by the Hirzfelds in 1919 : group O 46.4 per cent, group A 43.4 per cent, group B 7.2 per cent, and group AB 3.0 per cent.

The findings in the small foreign samples are also in accordance with figures recorded by others, and show the characteristic fall in the frequencies of groups O and A and the rise in group B as one moves south and east across Europe; the Czechoslovaks clearly belong to the eastern European type. Of the inhabitants of southern Asia and Africa, 30-40 per cent are in group O, and group B is more common than group A; the Indians and Chinese are mostly similar, but over 10 per cent are in group AB. There is the curious 'Human' group of Chinese with a distribution like that found by Dobson and Ikin in their Czechs—i.e. group O 28.4 per cent, group A 46.2 per cent, group B 15.7 per cent, and group AB 9.7 per cent. The American Indians, both north and south, are remarkable for being nearly all group O. Within these large averages, smaller variations occur from place to place, as Dobson and Ikin illustrate with small samples from Cambridge and London. Their figures will form a firm basis for the assessment of blood available for transfusion.

Acute Infectious Lymphocytosis in England

By A. J. STEIGMAN

(Abstracted from the *Lancet*, ii, 28th December, 1946, p. 944)

A PAUCITY of clinical symptoms and a hyperlymphocytosis are characteristic of this communicable disease. No bacteria or viruses have been isolated, and Smith found an incubation period of 12-21 days. Biopsy of lymph-nodes shows a degeneration of the lymph follicles with proliferation of the reticulo-endothelium of the sinuses.

Most of the patients seen in the U.S.A. had no symptoms, the diagnosis being established on routine blood-counts in certain convalescent homes, orphanages, etc. The disease is almost entirely confined to children; those few with symptoms have had mild upper respiratory symptoms, low-grade pyrexia, cervical adenopathy, irritability, abdominal pain, and meningeal irritation.

Laboratory examination shows 12,000-100,000 leucocytes, with 50-90 per cent of small mature lymphocytes, and these findings may persist even up to several months. Bone-marrow smears show an increased percentage of small mature lymphocytes. No anaemia or thrombopenia develops, and the heterophil agglutination reaction is negative.

The differential diagnosis requires the exclusion of infectious mononucleosis (spleen, general adenopathy, angina, fever, atypical immature lymphocytes, and a positive heterophil agglutination); lymphocytic leukaemia (enlarged lymph-nodes and spleen, fever, lymphoblasts, development of anaemia and thrombopenia); and pertussis (clinical course and bacteriology).

The communicability of this disease is attested by the institutional outbreaks in the U.S.A., showing a high attack-rate. The exact mode of transmission is not known; treatment is symptomatic.

Three sporadic cases and a small outbreak of six cases were seen in 1942 in England. The sporadic cases, in common with the first American cases of Smith, had mild fever, malaise, fatigue, slight sore throat, and slight cervical adenopathy. The remaining six cases came from one village within a fortnight. The degree of cervical adenopathy was rather striking, but the

benign course, protracted lymphocytosis, and the absence of significant bacteria, anaemia, thrombopenia and heterophil antibodies were typical.

The recently recognized disease in children is probably not really new; probably institutional outbreaks, described as mild atypical forms of infectious mononucleosis, were really acute infectious lymphocytosis. Though the disease has been of special interest to paediatricians, there is no assurance of age limitation, just as there is no assurance of geographical limitation. All cases clinically detected so far have been very benign.

Diet and Canine Hysteria

By E. MELLANBY

(Abstracted from the *British Medical Journal*, ii, 14th December, 1946, p. 885)

THE practice of bleaching and improving flour by NCL, known as the agene process, is responsible for a flour which produces canine hysteria. The evidence is of a direct kind; the abnormality being produced by diets containing the treated flour, samples of the same flour untreated being harmless. Substitution of the treated flour by the untreated type tends to reverse the animal's condition and allows complete recovery from the hysteria and fits, even though the animal itself may not be normal. Recovery from the slighter but more chronic condition appears to bear a relationship to the length of time the animals have received the treated flour. If they have had it for a long period—e.g. six months—recovery may not be complete even after three to four months on the untreated flour, although the more severe abnormalities, such as hysterical and epileptiform fits, will cease within 24 to 48 hours of the change of diet.

It is agreed by experts in milling practice that the agene process affects the gluten of flour particularly. Chlorine can act energetically upon gluten, and the nature of the reaction includes the entrance of chlorine into such important parts of the gluten complex as the tyrosin and tryptophane groupings. These remarks upon chlorine apply also to nitrogen trichloride and evidence has been given that its action (i.e. that of NCL) on the protein of flour is probably similar to what we have already described in the case of chlorine.

The abnormal behaviour of the animals affected by the agenzized flour suggests that the central nervous system is primarily affected by some toxic agent, but other organs may also be involved. A few dogs have died in these attacks, but ordinary post-mortem examination has not yet revealed any lesion which can be regarded as the essential one. It is clear that investigations must now be made to see whether human beings are affected by bread made from flour improved by NCL.

Penicillin in the Treatment of Thiouracil Agranulocytosis

(Abstracted from the *British Medical Journal*, ii, 14th December, 1946, p. 899)

AGRANULOCYTOSIS may occur as a serious complication during treatment with methyl thiouracil. Reports in the American literature of the success of penicillin in this condition prompted its use in this case. It would seem that penicillin is a most convenient form of therapy for agranulocytosis.

A New Anti-Allergic Serum

(Abstracted from the *Current Science*, Vol. 15, September 1946, p. 248)

ALLERGIC reactions, which appear in man after injection of horse serum, are believed to be manifestations of antigen-antibody reactions.

Enzymic treatments of horse serum proteins appear to reduce their specific antigenicity. A large part of the immune bodies is, however, lost during enzymic treatment and subsequent processing.

The alternative method of preventing serum reactions by inactivating the antibody has given satisfactory results. For this purpose, anti-human serum is prepared in horses. Horses are injected intravenously every fifth day with pooled human serum of doses which gradually decrease from 250 ml. to 25 ml. The serum of such horses contains complement-fixing antibodies to human serum proteins, and inhibits appearance of serum reactions in man. Thus, the same serum, which contains the antigen which is responsible for the serum reactions, also contains the protective substance which inhibits serum reactions presumably by inactivating the antibody.

The anti-human serum has not shown any untoward effects in man. It is, therefore, quite safe to use this serum in man for the prevention or inhibition of allergic reactions.

Vitamin K in General Practice

By D. M. EVANS

(Abstracted from the *Practitioner*, Vol. 157, November 1946, p. 391)

SINCE the beginning of the recent war the writer has been greatly puzzled by slight but definite changes in the behaviour of certain diseases among his patients particularly regarding incidence and course and also the effectiveness of treatment.

He has found a wider age-incidence in such conditions as nasal catarrh, impetigo, fibrositis following mild infections; increased liability to recurrent 'colds' and increased incidence of such 'extension' conditions as conjunctivitis, Eustachian catarrh and otitis. The usual forms of treatment have seemed gradually to lose their effect and even more advanced methods have in turn seemed to become less effective of late. For instance, before the war impetigo in children was usually curable with little difficulty by the use of ammoniated mercury ointment and later by sulphonamide therapy. Now he finds that the sulphonamides, vaccines and even penicillin tend to take longer than at first to end the condition, with little guarantee against recurrence.

Such changes he has long suspected to be due to the lack of some factor, missing either from the changed diet or as a result of such change. By a coincidence, while using vitamin K analogue (acetomenaphthone) in the case of a nursing mother with a baby suffering from steatorrhea, he was led to believe that vitamin K might be the substance involved in the changes he had observed.

As a result of this case, he experimented further in cases of obvious toxemia due to various conditions and was frankly amazed by the results. However prejudiced he assumed himself to be and in spite of many arguments he put forward against the likelihood of their being directly attributable to the treatment prescribed. Acetomenaphthone he first used alone and found it markedly effective in the toxic stages of the illness treated, but later added nicotinic acid as a result of the observation that even with rapid recovery the patients either showed marked signs of deficiency of the latter vitamin or had recurrence of their original symptoms after apparent cure.

In some cases, such as impetigo and furunculosis, additional local or general treatment was necessary, although these latter were almost useless alone.

Many cases have been treated, including primary colds, chills, acute nasal catarrh, acute sinusitis, acute catarrhal bronchitis, influenza, and chronic tonsillar and dental sepsis.

He has also observed that in patients requiring morphine or its derivatives while being treated with acetomenaphthone, the expected nausea and malaise were absent.

The diversity of conditions which seem susceptible to treatment with vitamin K suggests that this vitamin

may have some importance in the mechanism of resistance to infection, possibly by facilitating detoxication. As prothrombin, an essential factor in the defence of the body, is synthesized by the liver with the aid of vitamin K, and since the liver, the chief detoxicating centre of the body, is responsible, by virtue of its secretion of bile salts, for the absorption of this vitamin, it seems likely that vitamin K might also be essential to the liver in that other phase of defence, namely, detoxication.

Conjoined Action of Penicillin and Bacteriophages

By W. J. MacNEAL, et al.

(Abstracted from the *Journal of Laboratory and Clinical Medicine*, Vol. 31, September 1946, p. 974)

CULTURES of staphylococcus moderately resistant to penicillin and to bacteriophages may be more effectively inhibited in their growth by a combination of these agents. Similar observations have been made on cultures of colon bacilli and some types of streptococci.

Severe types of infection with staphylococcus, such as chronic osteomyelitis, facial carbuncle, and staphylococcal endocarditis have responded to combined therapeutic use of penicillin and bacteriophages.

Intestinal perforation associated with general peritonitis and bacteremia has been successfully treated with coli bacteriophage and penicillin.

Bacterial endocarditis due to streptococci relatively resistant to penicillin has responded favourably to treatment with penicillin and suitable streptococcus bacteriophage.

Gargoylism

(Abstracted from the *Medical Journal of Australia*, Vol. I, 22nd June, 1946, p. 890)

A MALE child, aged fifteen months, with some of the features of *dysostosis multiplex* or gargoylism was shown. The child had been born at term and the confinement was normal. His birth weight was seven pounds and seven ounces. His mother suffered from a twisted ovarian cyst when she was five months pregnant, but this subsided with the administration of morphine. She had a number of small vaginal hæmorrhages from six months till term. She had suffered from no infectious disease. The baby sucked poorly and breast feeding could not be established. No trouble was experienced with artificial feeding. At first 'Lactogen' and later cow's milk mixtures were used.

The child was first seen when he was seven months old. The mother had observed some stiffness of the legs and hips and had commented on the fact that he had kept his fists clenched. She reported that he had been backward in development and made peculiar snorting noises. At seven months he weighed eighteen pounds six ounces, and his head circumference was eighteen and seven-eighths inches. The forehead was prominent. The breathing was snuffly, though no nasal discharge was present. The features were coarse and he was retarded mentally. There was limitation of movement at the elbows, fingers and knees. The cornea were not clouded. No localized kyphosis was present and the spleen was not palpable. Dr. Colin Macdonald had reported that the x-ray appearances were consistent with a diagnosis of *dysostosis multiplex*. There was thickening of the frontal bones, the supra-orbital ridges being wide and prominent. The calvarium presented a ground-glass appearance and the *sella turcica* was small. The ribs were thick and heavy. The vertebrae showed some degrees of platyspondylitis, but a hook on the anterior aspect of the twelfth thoracic or first lumbar vertebra could not be demonstrated. X-ray examination of the pelvis revealed

bilateral subluxation of the hips and *coxa valga*. The subluxation was poorly defined on each side. The femora were thicker than normal.

All the stigmata were not present, but sufficient evidence was present to justify his making a definite diagnosis and leaving it in the category of *forme fruste*. A comprehensive article on the subject with good illustrations could be studied in *The Quarterly Journal of Medicine*, 1936.

Löffler's Syndrome: Report of a Case with Pathologic-Examination of the Lungs

By E. C. BAILEY, *et al.*

(From the *Archives of Pathology*, Vol. 40, November-December 1945, p. 376, as abstracted in the *International Medical Digest*, Vol. 48, May 1946, p. 285)

THE post-mortem examination was limited to a study of the lungs. There were numerous adhesions between the visceral and the parietal pleura. Approximately 300 c.c. of serosanguineous fluid were present in each pleural cavity. The bronchi contained considerable tenacious mucosanguineous exudate.

Numerous irregular-shaped regions of increased density were scattered throughout both lungs. The pleura was thickened over these regions, and adhesions were frequently present. The cut section revealed these areas to be of varying size and shape. The largest measured roughly 5.0 cm. in its greatest extent, while the smallest were only a few millimetres in diameter. Some of the latter resembled tubercles. The nodular regions were greyish-yellow and firm to palpation, and no exudate could be expressed from them. In the lower lobes there were larger, dark red, consolidated regions at the bases which exuded serum and blood. The bronchi contained mucus, and the walls of some of them were greatly thickened. The alveoli appeared dilated, especially in the upper lobes. Portions of the nodular and the consolidated regions were removed with sterile instruments and referred . . . for culture and guinea-pig inoculation with a view to the possible presence of *Mycobacterium tuberculosis*. The results were reported as negative.

Sections taken from the firm, scarlike regions revealed extensive replacement of the normal parenchyma of the lung by masses of fibroblasts and collagenous fibres. In the meshes of the latter were large numbers of eosinophilic leukocytes, plasma cells, lymphocytes and some giant cells. These cells were found in focal collections and also diffusely distributed throughout the new connective tissue. The appearance was that of an unusual form of organized pneumonia in which there was an abnormally large number of eosinophilic leukocytes. In some portions of the pneumonic process there was also focal, tubercle-like lesions. The centres of these lesions consisted of acidophilic granular necrotic material. Mononuclear cells and fibroblasts could sometimes be observed in between the clumps of acidophilic granular necrotic debris. Eosinophilic granules could be detected in the clumps of granular material. Large histiocytes, epithelioid cells and fibroblasts surrounded the central portion of the

lesion. These cells were usually arranged radially. An outer zone of eosinophilic leukocytes, plasma cells and lymphocytes was present. Multinucleated giant cells of variable shape and nuclear arrangement were observed occasionally in the tubercle-like lesions. The latter did not have the typical appearance of the tubercles of tuberculosis. A superficial resemblance to the granulomatous lesion of rheumatic fever was discernible. The walls of the arteries and arterioles were moderately thickened. The capillaries were dilated, and hemorrhages were common. There was a severe periarterial and pericapillary inflammatory process in which eosinophilic leukocytes and plasma cells were the principal cellular elements. Actual necrosis of the arterial and venous walls was occasionally observed. In the region surrounding the organized pneumonia the alveolar walls were much thickened by a cellular exudate consisting largely of eosinophilic leukocytes, plasma cells and lymphocytes. This portion had the appearance of interstitial pneumonia. Moderate emphysema was present.

In sections of the lower lobes a more recent inflammatory process was evident. The alveoli contained serum, red cells and fibrin in addition to the cellular elements observed in the upper lobe. Large phagocytic cells were numerous and were found to contain vacuoles and pigment. Beginning organization of intra-alveolar fibrin was occasionally observed. The same vascular changes were observed as were present in the upper lobe. The tubercle-like lesions were frequently present. The bronchioles were filled with mucus and desquamated epithelial cells. Thickening and hyalinization of the basement membrane were prominent. There was no evidence of hypertrophy of the musculature but the walls were infiltrated with eosinophilic leukocytes and plasma cells. Interstitial pneumonia was also present in some regions. Moderate to severe emphysema was observed. Arteriolar sclerosis was graded 3 (on the basis of 1 to 4, in which 1 designates the least and 4 the greatest amount of sclerosis).

Sections of the upper and the lower lobes were appropriately stained for bacilli of tuberculosis, but no organisms could be found. No micro-organisms could be detected in sections stained by the Brown-Gram method.

Treatment of Ulcerative Colitis with Thiouracil

By L. MARTIN

(Abstracted from the *Lancet*, ii, 28th December, 1946, p. 914)

ADMINISTRATION of thiouracil in three cases, and methyl thiouracil in one case, of ulcerative colitis in relapse was followed by immediate improvement.

Hypothyroidism was not induced.

Further trials are needed to determine the necessary duration of treatment and to detect any effect on the natural course of the disease.

Thiouracil is chemically similar to synthetic 5-methyl uracil, which is effective in treatment of the anaemia and diarrhoea of tropical sprue.

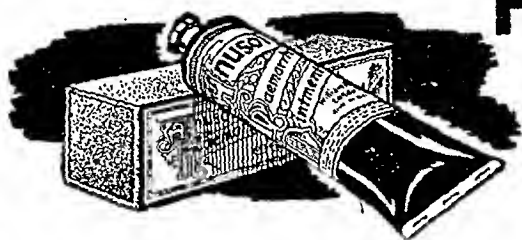
Reviews

TEXTBOOK OF MEDICINE.—By various authors: Edited by Sir John Conybeare, K.B.E., M.C., D.M. (Oxon.), F.R.C.P. Eighth Edition. 1946. E. and S. Livingstone Limited, Edinburgh. Pp. xx plus 1170. Illustrated. Price, 30s.; postage 9d. (Home)

THIS well-known and popular book has now reached its eighth edition, the first edition having been published in 1929. Of the shorter textbooks of medicine it is one of the best and has proved to be of great value to the student beginning his clinical career.

In most sections of this edition there have been only minor alterations. Some of the articles on tropical diseases have been rewritten. New additions include sections on menopause, penicillin therapy and aviation medicine as well as a table of physiological normals on the inside of the front cover for ease of reference. Each chapter appears to be a masterpiece of conciseness and clarity. The book is recommended to all students.

R. N. C.



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PULMONARY TUBERCULOSIS: A HANDBOOK FOR STUDENTS AND PRACTITIONERS.—By R. Y. Keers, M.D., M.R.C.P. (Edin.), F.R.F.P.S. (Glas.), and B. G. Rigden, M.R.C.S. (Eng.), L.R.C.P. (Lond.). 1946. E. and S. Livingstone Limited, Edinburgh. Pp. xvi plus 277. Illustrated. Price, 17s. 6d.; postage, 7d. (Home)

IN this new edition the book has been revised and partly rewritten, and includes some recent advances on the subject. The sections dealing with pneumoperitoneum and B.C.G. vaccines have been expanded. The number of illustrations has not been altered but some new x-ray photographs have been substituted. Each is accompanied by line drawings with legends. Here the student will find that when he comes to put his knowledge into practice he will be amply repaid for the time spent in their study. As a concise up-to-date account of pulmonary tuberculosis this handbook ought to be welcomed not only by medical students but also by general practitioners.

R. N. C.

GLOBAL EPIDEMIOLOGY: A GEOGRAPHY OF DISEASE AND SANITATION.—By James Stevens Simmons, B.S., M.D., Ph.D., Dr.P.H., Sc.D. (Hon.), Tom F. Whayne, A.B., M.D., Gaylord West Anderson, A.B., M.D., Dr.P.H., Harold Maciachlan Horack, B.S., M.D., and Collaborators. Volume I. Part I:—India and the Far East. Part II:—The Pacific Area. 1944. William Heinemann (Medical Books) Ltd., London. Pp. xxvi plus 504. Illustrated. Price, 30s.

GLOBAL EPIDEMIOLOGY produced by the U.S.A. Government Agencies, in response to urgent military requirements during the war, displays the thoroughness of scientific planning which characterized all U.S.A. war endeavours. It is an admirable guide book for a foreigner interested in the health problems of India and the Far Eastern countries some of which are more or less a closed book to most people. The reader will find an account of the public health and medical relief set up of the country, facilities for the production of drugs and biological products, a short account of the principal diseases prevailing in the area, of the insect vectors—actual and potential—and of other harmful agencies. It also deals with environmental sanitation. Certain instructions are given for the benefit of the non-technical new-comer.

An important point brought out by the surveys of different countries is, as the authors tersely put it, that the only permissible generalization is to state that generalization is impossible. Each country or part of country is a problem by itself in regard to a given disease and any one who aims at solving these problems without a thorough objective study is doomed to disappointment. The man, society and environment vary, and so also the host-parasite relationship and its manifestations. This complex mechanism of epidemiological happenings is further complicated by ecological differences in insects and other intermediary hosts. To quote a well-known instance, the diversity of breeding habits of malaria-carrying species of mosquitoes entirely changes the problem of malaria control from place to place. To take another instance in New Mehrides, *A. aegypti*, which is a day-biter elsewhere, changes its habit to night biting when it gets older.

Many less-open countries are free from certain diseases at present but in this age of shrinkage of the globe due to the annihilation of distance there is danger of these countries being laid open to exogenous diseases to which the indigenous population is non-immune. They are threatened with a grave situation unless our World Health Organization takes advance measures for their security. This point has been fully illustrated. However, a careful perusal of the work will also make one wonder why with all available facilities certain diseases have not acquired a much wider distribution. This suggests much deeper studies than the survey reported here.

The authors rightly claim that besides serving an important, though temporary purpose during the war, these studies should be of considerable value in peace time. It is a war legacy of the desired type. This purpose would be best served if an agency like the World Health Organization could continue the observations and keep the records up to date.

Since a large volume of scattered literature has been put together much data, which would otherwise be unavailable to workers in different countries, has been made accessible. Thus comparative epidemiology may yield useful results. However, it would be a mistake to think that the surveys recorded in this book are detailed enough for the formulation of public health schemes and programme for the countries' concerned as much more detailed studies of man, society and environment are necessary for the purpose. The name selected is a happy one. It emphasizes two important features of public health, viz, the large scope for beneficent human relationship and the growing intimacy and interdependence of different countries of the world.

R. B. L.

DISEASES OF THE NERVOUS SYSTEM DESCRIBED FOR PRACTITIONERS AND STUDENTS.—By F. M. R. Walshe, M.D., D.Sc., F.R.C.P. (Lond.), F.R.S., D.Sc. (Hon.), Nat. Univ., Ireland. Fifth Edition. 1947. E. and S. Livingstone Limited, Edinburgh. Pp. xvi plus 351. Illustrated. Price, 16s.; postage, 7d. (Home)

THIS comparatively new book, first published in 1940, has already become an old friend. The present edition is the fifth. In between editions it has been reprinted three times.

Written for practitioners and students the book excels in clarity and brevity. Complicated details of doubtful histology which demoralize students and bore practitioners have been kept out.

The subject is well covered: one could have said fully covered if one were not aware of omission of some diseases (*Myotonia congenita*, for instance) described by the author, as a contributor, in a textbook of medicine.

The lack of enthusiasm in penicillin in the treatment of early dementia paralytica (p. 174) does not appear to be in keeping with the recent American reports.

S. D. S. G.

AN INTRODUCTION TO SOCIAL BIOLOGY.—By Alan Dale, B.Sc. 1946. William Heinemann (Medical Books) Limited, London. Pp. vii plus 396. Illustrated. Price, 15s.

THIS interesting book will probably be recast in the next edition with a view to separating the basic sciences a little. At present one finds the face view of a German wasp almost next to a geological table.

A few clarifications are also indicated. In *Man And Evolution*, for instance, one does not know whether by sub-man is meant a sub-Homo or a sub-sapiens species. It may not be possible to decide: Heidelberg man is known both as Homo heidelbergensis and Paleoanthropus heidelbergensis. The fact, however, should be stated, as can be done easily by giving the full zoological names to the species mentioned.

The chapters on *Man As An Animal* and *Maintaining the Human Species* are presented particularly well and include a very good account of genetics.

Space has been found in the last two pages for the obfuscation of 'Holism' (wholeness). 'The theory of Holism postulates a fundamental principle or tendency leading to the production of wholes, a creative tendency which causes the appearance of new wholes at successively higher levels'. Thus do biologists turn metaphysicists!

A very good attempt at popularizing biology. It is hoped that the size of the book will not increase in the future editions.

S. D. S. G.

THE RHESUS FACTOR.—By G. Fulton Roberts, M.A., M.B. (Cantab.). 1947. William Heinemann (Medical Books) Limited, London. Pp. 47. Price, 3s. 6d.

In this little pamphlet the author has aimed at giving the barest skeleton of the Rhesus Factor. He has succeeded.

Even case reports and treatment have been included and so has been an unorthodoxy in immunology that 'the first few drops of a transfusion could, so sensitize the patient that the next few drops could produce a reaction'. This of course is not only 'exceptionally rare' but simply does not occur.

The pamphlet consisting of 30 small leaves of straight-forward printing, without a binding, is priced at 3s. 6d. The price appears to be excessive.

S. D. S. G.

BOOKS RECEIVED

1. Nutrition. Bulletin No. 26. February 1947. Published by the Department of Food, Government of India, New Delhi. Pp. 32. Illustrated.

2. Feeding the Worker. Canteens in Industry. No. 11. February 1947. Published by the Government of India, Department of Food, New Delhi. Pp. 48. Illustrated.

3. Nutrition. Bulletin No. 27. March 1947. Published by the Department of Food, Government of India, New Delhi. Pp. 32. Illustrated.

Abstracts from Reports

ANNUAL REPORT OF THE WORKING OF THE CIVIL HOSPITALS AND DISPENSARIES IN THE PROVINCE OF ASSAM FOR THE YEAR 1944 WITH BRIEF EXPLANATORY NOTES. BY COLONEL S. L. BHATIA, M.C., M.D., F.R.C.P., C.I.E., I.M.S., INSPECTOR-GENERAL OF CIVIL HOSPITALS, ASSAM. PRINTED AT THE ASSAM GOVERNMENT PRESS, SHILLONG. PRICE, Rs. 4-12 or 7s.

The year opened with 325 hospitals and dispensaries of all classes and closed with 332 as against 288 (excluding those in the Naga Hills and Manipur) in 1943. This increase was due to the provision of two State Public, five State Special, one local fund and five Government subsidized dispensaries.

The total number of in-door and out-door patients treated at medical institutions increased from 1,468,390 in the previous year to 1,658,557. The increase was confined to the districts of Cachar, Sylhet, Khasi and Jaintia Hills, Lakhimpur, Goalpara, Darrang, Nowgong and Garo Hills. In other districts there was decreased attendance. The increase was ascribed to the high incidence of malaria in the rural areas particularly in the village of Baniyachong of the Sylhet district and also to the increased population.

The total number of beds provided in all classes of hospitals increased from 1,469 in 1943 to 1,997 in the year under report.

During the year under report, no important improvements to the State and Local Fund institutions were carried out from public philanthropy.

The major project which was carried out during the year was the sinking of 6 tube-wells in the compound

of the Tezpur Mental Hospital at an estimated cost of Rs. 31,536.

Venereal diseases.—The total number of patients treated for gonococcal infections was 2,395 against 2,130 in 1943. Syphilis cases treated rose from 1,103 in 1943 to 1,506 in 1944.

Cholera.—Six hundred and ninety-five patients were treated in 1944, against 4,112 in 1943.

Malaria.—The total number of cases treated was 801,577 with 296 deaths against 553,361 with 260 deaths in the previous year. The chief increase was confined to the districts of Sylhet, Khasi and Jaintia Hills, Goalpara and Darrang. The Assam Medical Research Society continued to confine itself to study malaria and its control during the year, but there was a great set-back in the activities of the Society due to the curtailment of staff.

Kala-azar.—The total number of cases treated in 1944 in dispensaries other than those directly under the Public Health Department was 5,400 against 6,163 in 1943.

Leprosy.—The leper asylums, colonies and wards continued to do valuable work during the year. Three batches of rural health inspectors under the Public Health Department were given short lecture demonstrations in the Sylhet Leper Asylum on the diagnosis of leprosy. Propaganda work with the aid of magic lantern demonstration and by means of distribution of leaflets at Government expense was continued.

Tuberculosis.—Anti-tuberculosis propaganda was carried out as in the previous year. Accommodation at the Chest Clinic Hospital at Shillong has risen from 28 to 47 during the year. Further, the Bejoyendra Clinic opened at Dibrugarh in 1944 was doing good work.

Yaws.—The total number of cases treated in dispensaries and hospitals was 375 in 1944 against 460 in 1943. The campaign against yaws was continued during this year.

The total number of subsidized dispensaries functioning at the end of the year was 13. The number of patients treated increased from 17,225 in 1943 to 31,499 in 1944.

The scheme for the re-organization of the nursing services in Assam is under consideration of Government. The trained nursing sisters in Dibrugarh, Sylhet and Gauhati continued their excellent works.

Two large hospitals at Lekhapani and Saltspring were established during the year under report to provide medical facilities to the large number of porters engaged in connection with war in the Assam Frontier Area.

The dispensaries at Badarpur, Barpeta, Gauhati and Mariani established in 1944 rendered valuable service to the police staff of the Railway Security Police Organization.

A sum of Rs. 26,000 was sanctioned to the Blood Transfusion Service in Assam. The Blood Transfusion Officer was given training at Calcutta and Bombay. This organization did good work during the year.

Anti-malarial work and anti-infection measures were carried out by the civil medical authorities in and around aerodromes in Assam during the year under review.

SIXTEENTH ANNUAL REPORT OF THE ASSOCIATION FOR THE PREVENTION OF BLINDNESS, BENGAL, FOR THE YEAR 1945-46

Research.—Captain E. J. Somerset, I.M.S., one of the joint honorary secretaries of the Association, has been appointed by the Indian Research Fund Association, a member of the Clinical Research Advisory Committee. A research on the causes of blindness has been sanctioned and is in progress at the Eye Infirmary, Medical College, Calcutta. So far 1,400 cases has been investigated.

Enumeration of the blind.—The number of blind counted in the villages of Bengal has been recorded

according to age, sex, occupation and probable causes of blindness. Out of a total population of 68,749 in 113 villages counted during the year 121 persons were found completely blind. The probable causes of blindness were cataract, smallpox, glaucoma, couching, corneal ulcer, keratomalacia, etc.

Propaganda.—Preventive activity of the Association was carried out with the help of magic lantern slides, posters, movies, etc. Lectures and demonstrations were given in schools, colleges, associations, orphanages, exhibitions, etc.

Routine work.—There are at present five travelling eye dispensaries at work in Bengal, which treated 58,024 cases during the year. One thousand nine hundred and twenty operations were performed, including 589 for extraction of lens. The eye examination and lecture unit in Calcutta has carried out 3,636 eye examinations which shows various defects of which the most important are conjunctivitis, myopia and leucoma (probably result of corneal ulcer).

General.—More funds are essentially required, and the Committee are anxious that their activities should not be curtailed for inadequate money. The Committee hope that the Government and the public will continue to give their support so that these five travelling dispensaries may continue to serve permanently.

Mr. L. R. Fawcus, I.C.S., President of the Association, is retiring and will be succeeded by Mr. Justice C. C. Biswas.

R. N. C.

Correspondence

MEDICAL TREATMENT OF INTESTINAL OBSTRUCTION

Sir,—The article on 'Medical Treatment of Intestinal Obstruction' published on page 10 of January 1947 issue of the *Indian Medical Gazette* is capable of wrong conceptions. Allow me therefore to make a few comments:

1. (a) Mortality of 40 to 80 per cent refers to cases where medical treatment has failed.

(b) Question of operative treatment by those having neither facilities nor experience is nowhere contemplated.

(c) Hospitals usually get late cases, even moribund cases.

It is therefore I say that I would risk my reputation and recommend operation no sooner diagnosis is firmly established rather than wait on the off-chance of obstruction clearing itself or volvulus untwisting itself by the injection treatment. I personally believe that even in a doubtful case risk of laparotomy is a hundred times less than leaving a case of obstruction for a few hours.

When a patient point blank refuses operation then any treatment is good enough. I mean physostigmine, gynergen or even pituitrin, atropine, eserine, etc. The justification for an opinion in favour of author's treatment as against a laparotomy is untenable.

2. A practical suggestion about the level of obstruction, i.e. large or small intestine, might be helpful. In small gut obstruction vomiting is early and distension more a suggestive fullness, whereas in large gut, vomiting is a late phenomenon while abdominal distension an early occurrence.

3. First enema is of little importance. It is only the second enema which matters, i.e. if results of this are disappointing, i.e. no faeces, above all no flatus.

4. The author makes no mention of gastric aspiration and lavage the benefits of which are numerous.

TRICHINOPOLY.

P. V. KARAMCHANDANI,
LIEUTENANT-COLONEL, I.M.S.,
District Medical Officer.

Any Questions

DEGREES IN PHARMACY

SIR,—I am a qualified Government apothecary of 17 years of service in the medical department of Ceylon. I am anxious to study further to obtain the diploma or degree of M.P.S.—Member of the Pharmaceutical Society, England. But owing to financial difficulties I am unable to proceed to England.

I understand there are institutions now in India where necessary tuition is given for similar diplomas or degrees. If such are available please let me know the names and addresses of the institutions or schools as early as possible.

Yours, etc.,

B. C. A. KADIPPILY.

GOVERNMENT DISPENSARY,
RANNA (CEYLON).

[There is no institution in India where a diploma of M.P.S. (Lond.), Ph.C., or B.Pharm. (Lond.) is offered. You can get these only by undertaking a course of study and practical training at the Pharmaceutical Society of Great Britain, 17, Bloomsbury Square, London, or any institutions affiliated to that body.]

The degree of B.Pharm. or B.Sc. Pharm. is being offered at the Benares Hindu University, Andhra University, the Madras University, the Bombay University and the Punjab University. The minimum basic qualification required for entrance to these courses is Intermediate in Science with Chemistry, Physics and Biology or Mathematics as the main subjects. The Madras University course is a two-year one, whereas in all other places a three-year course is enjoined. In the Andhra University, the degree is offered under the Technology Faculty.

If you have passed an examination similar in standard to I.Sc. prior to your qualification as an apothecary, it might be possible for you to gain admission in one of the institutions referred to above. You have to be a Matriculate of London University to get admission into the pharmaceutical courses in London University. An apothecary not having the minimum basic qualifications mentioned above is usually not admitted into the courses leading to M.P.S. diploma in London or to one of the degree courses either in India or U.K.

Reference may be made to *Indian Journal of Pharmacy*, Pharmacy Number, vol. 6, 1945, pp. 47-48, for further particulars. Copies of the journal can be had from the Benares Hindu University, Benares.—B. M.]

STORAGE OF PENICILLIN

SIR,—With reference to Dr. Rajendra Singh's letter which appeared in your issue for December 1946 regarding 'Storage of Penicillin' the following extracts from a circular note issued by Messrs. H. J. Foster and Co., Bombay, dated 4th February, 1947, appear in conflict with the writer's recommendation to keep penicillin in either refrigerators or ice-boxes.

'It is now known that the stability of solid penicillin of this degree of purity (84-93 per cent) is more dependent on the exclusion of moisture than upon any other single factor. Storage at 100°F. does not by itself destroy penicillin "Glaxo".

Samples of penicillin "Glaxo" kept at ordinary room temperature in Bombay and re-assayed by Glaxo Laboratories Ltd. at intervals extending over six months after manufacturing date have shown no appreciable loss of potency.

Do not keep penicillin in a vacuum flask containing ice or in an ice-box in which the containers are in actual contact with the ice. It is much preferable to keep it dry at room temperature, for even the best

of rubber-capped containers will not exclude moisture indefinitely if kept under damp conditions.

It would be interesting to know what the effect on potency of penicillin would be if stored under the ideally dry conditions stipulated but exposed to the very high temperature obtaining in the plains in the hot weather, say anything up to 120°F.

Yours faithfully,

B. J. BOUCHE, M.B.C.S., L.M.C.P.,
MAJOR, I.M.D. (retd.).

P.S.—From the foregoing it would appear that cold storage in hill stations is unnecessary. How long would it be considered safe for the solution to be kept in cold storage or otherwise once it has been made up? The latest reviews on penicillin are silent on these points.

[*Penicillin powder*.—Both temperature and moisture—individually and collectively—have an effect on the rate of deterioration of penicillin. The 'brand' of penicillin and the type of stoppers and seal employed are also important.

That temperature alone has an effect on the rate of deterioration is evident from the progressive loss of activity of penicillin, even when it is contained in flame-sealed all-glass ampoules. At 80°C. there is usually no loss of potency, whereas at 56°C. there is always a certain amount of loss of activity. It has been reported that certain samples of 85 to 93 per cent degree of purity remain stable up to 6 months at 37°C. Crystalline penicillin sodium kept for 1 month at 56°C. does not show any detectable loss of activity.

It is quite possible therefore to have a preparation of penicillin which will remain stable up to 6 months at ordinary temperature.

The effect of moisture on the activity of penicillin is usually most evident in rubber-stoppered aluminium-sealed vials, which may absorb moisture. The loss of activity in these vials usually increases progressively in the range of high temperatures. Moisture uptake up to 2.5 per cent does not result in much loss of potency in 3 months, while at 6 months when the moisture content reached above 4 per cent, activity is stated to decline by 30 to 40 per cent. At 8°C. no loss of potency occurs even though the moisture increased to about 3.3 per cent. It would seem, therefore, that uptake of moisture at low temperatures is not accompanied by loss of activity as rapidly as at high temperatures.

Penicillin solution.—Solutions of commercial penicillin which are available in these days (purer stuff than used to be obtained before) are more stable. The claim of the Glaxo Laboratories regarding the stability of their preparation is apparently based on this. At refrigerator temperature (2°C.), the loss of activity is not seen even after 60 days' storage. Even at a temperature of 36.7°C. (98°F.), penicillin solutions have been found to retain full potency up to 4 days. Therefore it appears that except in hot weather in the plains, it is unnecessary to keep penicillin solution under refrigeration. Ordinarily solutions of penicillin should only be made in quantities which can be used up within 24 hours.

Keeping of penicillin vials in a vacuum flask or in ice-box in actual contact with the ice is not considered a satisfactory method of storage. In many instances, the ice melts and the vials topple over with the result that the cap and the seal comes directly in contact with iced water. This naturally tends to help absorption of moisture, at least in cases where the seal is not absolutely crack-proof. It is definitely better to keep the penicillin bottles in refrigerator, or failing which, in specially designed ice-box where there is no chance of the vial coming in contact with the ice.

The following references may also be of interest in this connection:

- (1) The stability of penicillin sodium held at various temperatures: *J. Am. Pharm. A. (Scientific Edition)*, 34, 110-113, April 1945.

- (2) Stability of solutions at room and incubation temperatures: *J. A. M. A.*, 125, 628-629, July 1944.
- (3) Penicillin stability and activity in solution and in ointment: *War Medicine*, 7, 168-169, March 1945.—B. M.]

UNDIAGNOSED FEVER

Sm,—A coolie woman, aged about 30 years, gave birth to a male child in the early morning of 2nd March, 1947, without any trouble. She had slight temperature since two days before delivery. In the previous evening she had a variable rise of temperature which was not recorded. During confinement it is stated that there was no obvious temperature, but on the day of delivery at about 12 o'clock she got high temperature with shivering and rapidly got unconscious with convulsions.

I attended the case about 3-30. I found her completely unconscious. During my visit she had a convulsion. The temperature was 105°F. Pulse was rapid, voluminous and of high tension. Spleen was felt just below the costal margin and was soft in consistency. Liver was not palpable. Head was not retracted; Kernig's sign negative. Lungs were clear. The temperature persisted throughout the night. Next morning I found the case deteriorating, temperature being the same. The patient finally collapsed and expired at about 2 o'clock.

I gave one injection of quinine gr. x intramuscularly on the 2nd March. The party refused to have any more injections. Two tablets of M&B 693 were administered dissolved in water, but as there was locked jaw throughout, the tablets could not be swallowed. One blood smear was taken on the 3rd March after administration of quinine on the previous day. I shall be obliged if you kindly arrange to get the blood smear examined and let me know the diagnosis.

Yours, etc.,

T. S. BHADURY, L.M.F.

RYDAK TEA ESTATE,
E. DOOARS.

[The blood film shows definite evidence of leucocytosis (about 12,000 to 14,000 per c.mm.) with relative polymorphonuclear preponderance. The differential leucocyte count shows polymorphs 78 per cent, lymphocytes 19 per cent and eosinophils 3 per cent. No malaria parasites have been found, and in view of the absence of parasites, it seems unlikely that it was a case of cerebral malaria. Though the blood was taken after intramuscular administration of a 10-grain dose of quinine in such a fatal case, one is most unlikely to miss the parasites as the film was taken at the height of symptoms. The presence of leucocytosis, though moderate, seems to point towards some sort of an inflammatory condition but it is not really possible to give a definite opinion at this stage.—S. S.]

PROPHYLAXIS WITH TETANUS TOXOID

Sm,—I have the honour to request you to be kind enough to inform me the latest authoritative views about mass prophylactic tetanus inoculation by tetanus toxoid (formalinized toxoid) injection 1 c.c. at the interval of six weeks and six months or one year.

As you know some say three such injections give immunity for life and some say two such injections give protection for two years.

Yours, etc.,

B. PURKAYASTHA.

MURKONG SELEK, P. O.
NORTH EAST FRONTIER,
ASSAM;
14th April, 1947.

[The most notable advance in the prevention of tetanus, the once dreaded disease of the army, was the

introduction in 1938 of the use of tetanus toxoid which, like diphtheria toxoid, is an example of active immunization in advance of exposure. The value of this method of protection is definitely established. Two injections of 1.0 ml. of tetanus toxoid are given with an interval of 6 weeks between the injections followed in a year by a reinforcing or 'boosting' dose of 1.0 ml. repeated at yearly intervals. As a further safeguard against the development of the disease tetanus antitoxin is administered to all considered infected with tetanus bacilli. The minimum dosage of antitoxin is 3,000 international units. This dosage should be increased 2 or 3 times when there is a likelihood of extensive infection.

Certain authorities (American and Canadian) use 3 initial doses of tetanus toxoid instead of 2 given above and instead of the passive protection in case of infections another dose of 1.0 ml. of tetanus toxoid is given as a 'boosting' dose.—C. L. P.]

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL M. A. JAFARY, Inspector-General of Prisons, United Provinces, is appointed Deputy Director-General, Indian Medical Service, with effect from the 21st February, 1947.

Lieutenant-Colonel D. Kelly, whose services are replaced at the disposal of the Government of C.P. and Berar by the Government of the United Provinces, is posted as Civil Surgeon, Chhindwara, with effect from 28th April, 1947.

Major J. P. Zachariah is appointed Medical Adviser (Pensions), (D. A. D. M. S.), Defence Department (Pensions Branch), 6th November, 1946.

On return from leave, Major T. Sommerville, an officer of the Medical Research Department, was placed on Foreign Service under the Indian Research Fund Association for the period from the 17th December, 1946, to the 31st December, 1946.

Major A. A. Khan, ex-I.M.S. (E.C.), is appointed Deputy Assistant Director-General, Indian Medical Service (Re-settlement), with effect from the 1st March, 1947.

The undermentioned officer of the I.M.S. (E.C.) reverts from the I.A.M.C. and is seconded for service in the Royal Indian Air Force :—

Captain Alland-Din. Dated 27th January, 1947.

LEAVE

Lieutenant-Colonel W. J. Webster, M.C., Assistant Director, Central Research Institute, Kasauli, is granted war concession leave on average pay in India from the 1st January to the 10th February, 1947, and leave ex-India on average pay from the 11th February to the 30th April, 1949, preparatory to retirement.

PROMOTIONS

The undermentioned officer is granted the local rank of Lieutenant-Colonel without effect on pay and pension whilst employed as Surgeon to H.E. the Viceroy :—

Major A. C. Taylor, O.B.E. Dated 20th March, 1947.

Captain to be Major

T. Denness. Dated 28th February, 1946.

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captains to be Majors

B. S. Nagra. Dated 5th June, 1946.

S. I. Sankaran. Dated 6th June, 1946.

W. L. Parnaik. Dated 11th June, 1946.
Sudhir Kumar Das. Dated 30th June, 1946.
R. Anand. Dated 29th August, 1946.
D. S. Piper. Dated 4th October, 1946.

5th October, 1946

S. Virmani. Birbal Sahni.
C. Sen Gupta. Dated 6th October, 1946.
J. W. Lusk. Dated 7th October, 1946.

5th November, 1946

H. K. Das. S. K. Bhattacharjee.
K. M. Kudva. Dated 6th November, 1946.
M. S. Haque. Dated 20th November, 1946.

RELINQUISHMENTS

The undermentioned officer is permitted to relinquish his emergency commission and is granted the honorary rank of Lieutenant-Colonel :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Lieutenant-Colonel W. B. Roantree. Dated 29th December, 1945.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Lieutenant-Colonel :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Lieutenant-Colonel Sumkar Mitra. Dated 27th January, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are replaced at the disposal of the Government of the Punjab with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Major J. S. P. Conlts. Dated 3rd November, 1945.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Ty. Major T. Bhadrury. Dated 28th August, 1946.
Major Navroji Manekji Kalapesi. Dated 11th October, 1946.

Major Yugal Kishore Champaram Pandit. Dated 3rd November, 1946.

Ty. Major Sulochan Ghosh. Dated 30th November, 1946.

Major Khushdil Khan Jaswal. Dated 3rd December, 1946.

Ty. Major V. R. M. Sadasivan. Dated 7th December, 1946.

Ty. Major Nazir-ud-Din Fathelali Shaikh. Dated 9th December, 1946.

Major D. K. Bose. Dated 17th December, 1946.

Major Mohd. Khalid Chandhary. Dated 17th December, 1946.

Ty. Major K. Jha. Dated 19th December, 1946.

Ty. Major B. L. Chuckerbutty. Dated 28th December, 1946.

Ty. Major Sunil Kumar Sen. Dated 2nd January, 1947.

Captain V. Krishnamachari. Dated 12th January, 1947.

Ty. Major Man Mohan Nath. Dated 20th January, 1947.

Ty. Major P. K. Kar. Dated 29th January, 1947.

Major Surath Kumar Bhattacharjee. Dated 14th February, 1947.

Major Hazura Singh. Dated 15th February, 1947.
Major Biraj Mohan Sinha. Dated 20th February, 1947.

Major B. S. Nagra. Dated 21st February, 1947.
Ty. Major Aduthorai Perumalkoil Krishnier Ramamurti. Dated 26th February, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain Aylmer Joseph Nicholas. Dated 24th May, 1946.

Captain Alfred David Paul. Dated 21st August, 1946.

Captain H. A. N. Rao. Dated 27th October, 1946.

Captain M. I. D. Sharma. Dated 1st November, 1946.

Captain R. C. Biswas. Dated 6th November, 1946.

Captain K. B. Nair. Dated 22nd November, 1946.

Captain C. J. Aiyandar. Dated 26th November, 1946.

Captain G. V. C. Iyer. Dated 17th December, 1946.

Captain S. K. Dey. Dated 26th December, 1946.

Captain Tejindar Singh Khurana. Dated 2nd January, 1947.

Captain S. M. Bhattacharjee. Dated 13th January, 1947.

Captain Rama Shankar Saksena. Dated 20th January, 1947.

Captain Vithal Sheshgir Joshi. Dated 31st January, 1947.

Captain V. Raghavachar. Dated 2nd February, 1947.

Captain P. G. Saha. Dated 17th February, 1947.

Captain B. Ahmad. Dated 19th February, 1947.

Captain S. C. Srimani. Dated 25th February, 1947.

Captain K. L. Atri. Dated 1st April, 1947.

(WITHIN INDIAN LIMITS)

Captain B. Gupta. Dated 23rd February, 1947.

(WOMEN'S BRANCH)

Captain (Miss) M. K. Verghese. Dated 17th February, 1947.

Captain (Miss) D. E. Thomas. Dated 1st March, 1947.

Captain (Mrs.) M. S. Naidu. Dated 4th March, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

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Captain J. K. Sen. Dated 27th October, 1946.

Captain S. Mukherjee. Dated 21st November, 1946.

Captain A. K. Nambiar. Dated 1st December, 1946.

Captain K. V. Sharma. Dated 13th December, 1946.

Captain K. S. Seth. Dated 16th December, 1946.

Captain R. S. P. Sinha. Dated 16th December, 1946.

Captain M. A. G. Bhutty. Dated 25th December, 1946.

Captain M. Ahmadi. Dated 11th January, 1947.

Captain P. F. Verghese. Dated 12th January, 1947.

Captain M. J. Verghese. Dated 20th January, 1947.

(WITHIN INDIAN LIMITS)

Captain L. A. F. J. I. Furtado. Dated 23rd January, 1947.

The undermentioned officer is permitted to relinquish his commission on reversion to the Indian State Forces. His services have been replaced at the disposal of the Government of Kashmir State :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain H. R. Gandotra. Dated 23rd March, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is

granted the honorary rank of Captain. His services are replaced at the disposal of the Government of Bombay with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain S. G. Deostnan. Dated 1st March, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are placed at the disposal of the Government of Mysore with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain K. S. Shadakharappa. Dated 2nd August, 1946.

The undermentioned officer is permitted to relinquish her commission on release from army service and is granted the honorary rank of Captain. Her services are placed at the disposal of the Government of Burma from the date specified below :—

(WOMEN'S BRANCH)

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain (Miss) J. M. Gaudsin. Dated 16th August, 1946.

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Original Articles

THE VALUE OF TRANSFUSION OF BLOOD IN THE TREATMENT OF ANÆMIAS *

By C. R. DAS GUPTA, M.B., D.T.M. (Cal.)
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TRANSFUSION of blood has long been recognized as an effective therapeutic agent in the treatment of anæmias. Judicious transfusion of blood, along with other measures, has been found to give very satisfactory results even in cases of severe anæmias. The present-day tendency has, however, been to rely entirely or unduly on the transfusion of blood alone in the treatment of any case of severe anæmia without any reference to the type of anæmia and the probable ætiology of the condition. The purpose of this paper is to assess the value of transfusion of blood in the different types of anæmia which were treated in the Carmichael Hospital for Tropical Diseases during the past few years.

Almost all the patients were Indians and were either Hindus or Muslims. On admission each patient was subjected to a thorough investigation, clinical and laboratory. The investigations included a complete cytological examination of the blood as to the type and degree of anæmia, as also examination of the blood for malaria, kala-azar, and syphilis; examination of the bone marrow by sternal biopsy; fractional gastric analysis; examination of the stool for any helminthic ova and protozoa; and examination of the urine for any abnormality. Special examinations, e.g. skiagrams of the chest or skull, were done wherever indicated.

On the basis of the investigations and for the purpose of this paper the cases of anæmias are classified under the following groups:—

A. *Deficiency dyshæmopoietic anæmias.*—

- (i) Nutritional macrocytic anæmia.
- (ii) Nutritional hypochromic anæmia.
- (iii) Dimorphic anæmia.

B. *Anæmia associated with some infection or infestation.*—

- (i) Kala-azar.
- (ii) Malaria.
- (iii) Hookworm.

C. *Anæmia associated with blackwater fever.*D. *Anæmia associated with aplasia of the marrow.*E. *Anæmia associated with other disorders of the blood.*—

- (i) Leukæmias.
- (ii) Essential thrombocytopenia.

F. *Anæmias in the childhood.*—

- (i) von Jaksch's anæmia.
- (ii) Cooley's anæmia.

The effect of transfusion of blood in the different groups

The procedure adopted in the treatment of anæmias and of any associated condition, if present, varied in the different groups and will be briefly described under their respective heads. The response to treatment with, or without, transfusion will be discussed in some details in cases of deficiency anæmias and short comments will be given in other cases.

A. *Deficiency dyshæmopoietic anæmias*

The first step in the treatment of the deficiency anæmias was the administration of the correct hæmatinics in adequate dosage as soon as the investigations were completed. Transfusion of blood was given at the outset along with the proper hæmatinics only to a very few cases of severe anæmia with debilitated conditions. Transfusion of blood was more generally given at the later stages to cases not responding well to hæmatinics. The response to treatment in 284 cases of deficiency anæmias with or without transfusion is shown in table I. A few representative charts along with short notes to illustrate the effect of transfusion of blood under different conditions are given.

Illustrative cases(a) *Cases of profound anæmia improving with hæmatinics alone without any blood transfusion.*—

Cases of nutritional macrocytic anæmia with red cell count of one million or below, but having cellular and megaloblastic marrow, have been found to improve remarkably well with hæmatinics alone. The improvement is about the same with crude liver extracts given parenterally (Das Gupta, 1943) with proteolysed liver given orally (Das Gupta, Ganguli and Chatterjea, 1946), or with synthetic folic acid (Lederle) also given orally (Das Gupta and Chatterjea, 1946).

Case 1.—Mrs. M., 25, was admitted with a red cell count of 0,700,000 per c.mm. Sternal puncture showed active megaloblastic marrow. The patient showed remarkable improvement with crude liver extracts given parenterally. With 12 injections given in course of 15 days, the red cell count went up to 3,410,000 per c.mm. in exactly 30 days (graph 1).

Case 2.—H. S. P., male, 21 years of age, was admitted with a red cell count of 0,970,000 per c.mm. Investigations showed that he was a case of macrocytic anæmia with cellular megaloblastic marrow. The patient improved rapidly with proteolysed liver given orally. The

* Read in the thirty-fourth session of the Indian Science Congress.

TABLE I
(i) *Nutritional macrocytic anæmia*

Level of red cell count	Number of cases	With transfusion number	Without transfusion number	RESULTS			
				With transfusion		Without transfusion	
				Improved	Died	Improved	Died
0.500,000 and below	5	1	4	Nil	1 (1-x-x)	3	1
Over 0.500,000 and up to 1,000,000.	52	14	38	10 (2-5-3)	4 (1-2-1)	36	2
Over 1,000,000 and up to 1,500,000.	52	9	43	6 (3-1-2)	3 (2-1-x)	39	4
Over 1,500,000 and up to 2,000,000.	28	3	25	3 (3-x-x)	Nil	25	Nil
Over 2,000,000 ..	33	Nil	33	..	..	32	1
All cases ..	170	27	143	19	8	135	8

(ii) *Nutritional hypochromic anæmia*

Level of hæmoglobin	Number of cases	With transfusion number	Without transfusion number	RESULTS			
				With transfusion		Without transfusion	
				Improved	Died	Improved	Died
3 gm. and below ..	6	1	5	1 (1-x-x)	Nil	4	1
Over 3 gm. and up to 5 gm.	20	2	18	2 (2-x-x) Not	Nil	18	Nil
Over 5 gm. and up to 7 gm.	34	1	33	1 (1-x-x)	Nil	32	Not improved 1
Over 7 gm. ..	14	Nil	14	..	Not improved	14	Not improved
All cases ..	74	4	70	3	1	68	1

(iii) *Dimorphic anæmia*

Level of red cell count	Number of cases	With transfusion number	Without transfusion number	RESULTS		
				With transfusion	Without transfusion	
				Improved	Improved	Not improved
1,000,000 and below	4	1	3	1 (1-x-x)	3	..
Over 1,000,000 and up to 1,500,000.	18	Nil	18	..	17	1
Over 1,500,000 and up to 2,000,000.	12	Nil	12	..	12	..
Over 2,000,000 ..	6	1	5	1 (1-x-x)	5	..
All cases ..	40	2	38	2	37	1

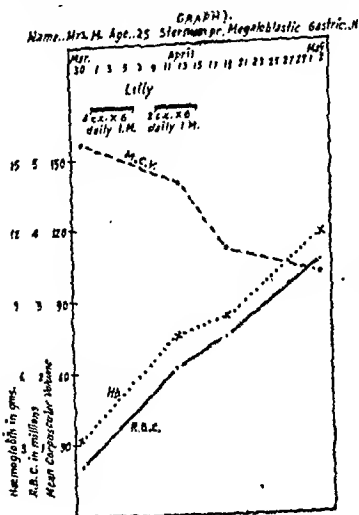
Indication of the figures in bracket under the head 'with transfusion'—

The first figure indicates—the number of cases having 1 transfusion.

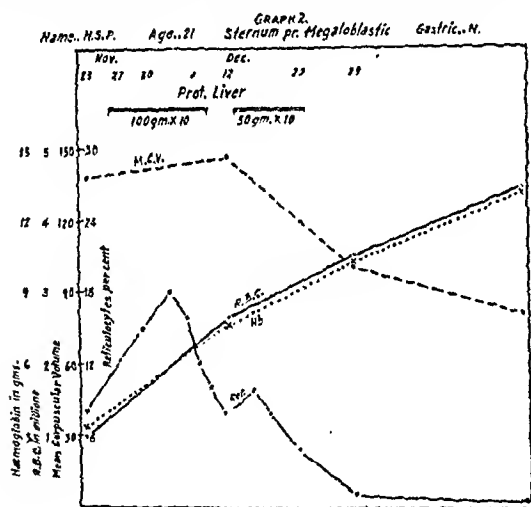
The second " " " " " " " " 2 transfusions.

The third " " " " " " " " 3 " or more.

red cell count went up to 3,460,000 per c.mm. in 33 days after two courses of proteolysed liver extract given within 25 days, with an interval of 5 days between the courses. Without any



further treatment the red cell count went up to 4,340,000 per c.mm. in three weeks (graph 2).

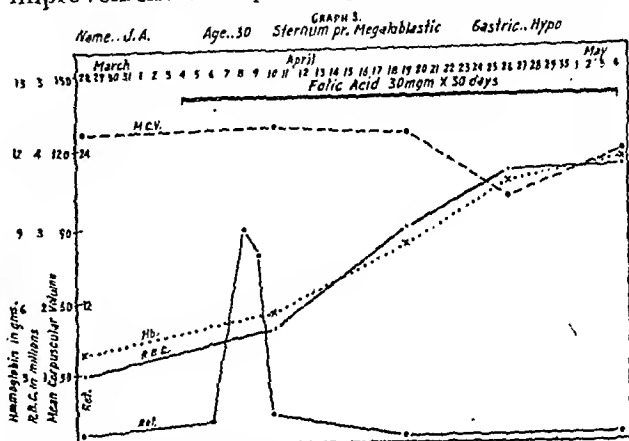


Case 3.—J. A., male, 30, was admitted with a red cell count of 0,950,000 per c.mm. Investigations showed that he was a case of macrocytic anæmia with megaloblastic marrow but with low gastric acidity. Administration of synthetic folic acid (Lederle) was followed by rapid improvement of the blood picture, the red cell count going up to 3,700,000 per c.mm. in about 30 days (graph 3).

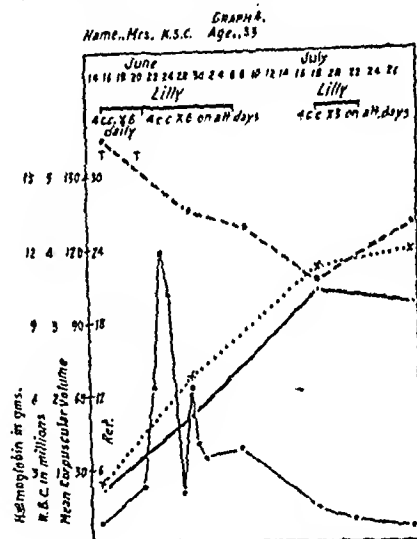
(b) Cases of profound anæmia improving with hæmatinics and transfusion.—In cases of very severe anæmia associated with marked debility, transfusion of blood is always given whenever suitable blood is available, along with hæmatinics with very good results.

Case 4.—Mrs. K. S. C., 33, was admitted in a very debilitated state with a red cell count of 0,660,000 per c.mm. Investigations showed macrocytic type of anæmia with megaloblastic marrow. On account of the debilitated condition, the patient was given two quick transfusions

of blood within one week of her admission into the hospital along with liver injections. The improvement was quite rapid, the red cell count



going up to 3,380,000 per c.mm. in 30 days (graph 4). It is to be noted that though the patient had had two transfusions along with liver injections, the rate of improvement in this case



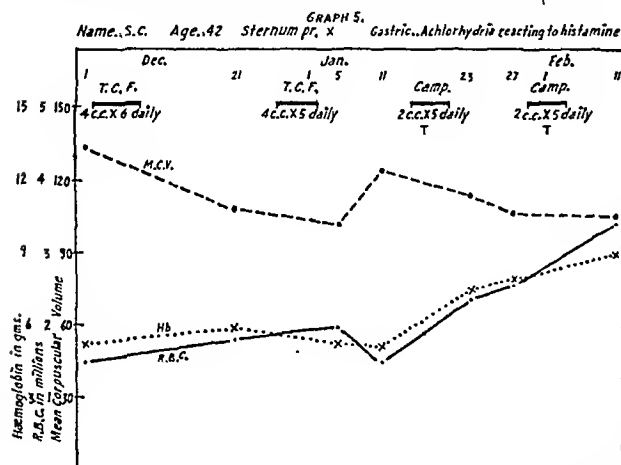
was not very much more rapid than in cases 1, 2 and 3, each of whom improved rapidly with hæmatinics alone.

(c) Cases of macrocytic anæmia not improving with liver extracts alone but improving with liver extracts and transfusion of blood.—(i) Some cases of macrocytic anæmia with cellular megaloblastic marrow may not improve with hæmatinics alone but will improve when transfusion of blood is given along with hæmatinics.

Case 5.—S. C., male, 32, was admitted with a red cell count of 1,580,000 per c.mm. The patient did not respond to T.C.F. liver injections, but he showed some improvement when some more liver injections of a different brand, campolon, were given along with a transfusion of blood. The patient showed still further improvement with another course of campolon injection and a second transfusion given along with it—(graph 5). Clinical improvement noted after both the transfusions as also the sub-maximal improvement after the first course of campolon would support the contention that the

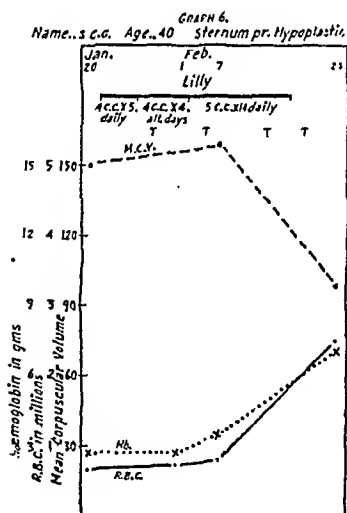
change of brand of liver extract was not the only factor in effecting improvement in this case.

(ii) Cases of macrocytic anæmia with hypocellular marrow generally do not respond to



hæmatinics alone but may respond to hæmatinics in big dosage and repeated transfusions.

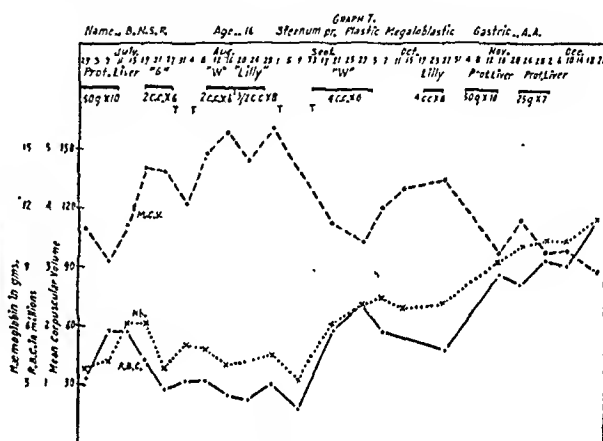
Case 6.—S. C. G., male, 40, a case of macrocytic anæmia with hypoplastic marrow did not respond at first to hæmatinics in the usual dosage although two transfusions were given during the first few days. Continuation of the treatment with big doses of liver injections of the same brand and a few more transfusions given at short intervals produced fair response (graph 6).



(d) Late response to hæmatinics and multiple transfusions in cases of macrocytic anæmias.—Some cases, specially those with big spleen, in spite of hypercellular megaloblastic marrow may not improve with hæmatinics and transfusion in the usual way. Many of these cases would, however, show good improvement with reduction in size of the spleen, if treatment with hæmatinics and transfusion be continued over a long period.

Case 7.—B. N. S. R., male, 16, was reported to be suffering from huge enlargement of the

spleen and anæmia for over five years. Investigations on admission showed that the boy had severe anæmia having a red cell count of 1,120,000 per c.mm. The anæmia was macrocytic in character. The bone marrow was very cellular and megaloblastic in reaction. Fractional gastric analysis showed absolute achlorhydria. The patient did not respond at all to treatment with potent liver injections and transfusions for the first four months. Continuation of treatment with liver extracts and transfusions produced very satisfactory hæmatological and clinical improvement including reduction of the size of the spleen. It is to be noted that the patient responded to the same liver extract in the later stage which had failed to produce any improvement in the earlier stages (graph 7).

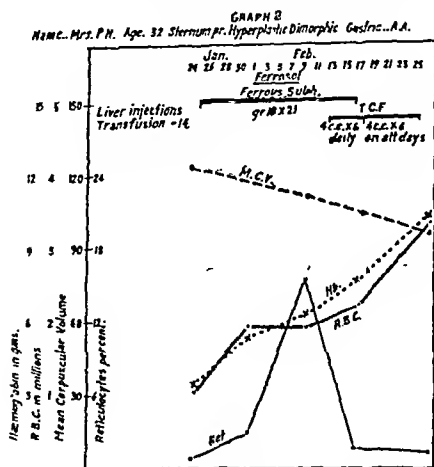


(e) Cases not improving with multiple transfusions in the absence of any hæmatinics or in combination with incorrect hæmatinics but responding to the correct hæmatinics without any further transfusion.—Not infrequently transfusion of blood is given without proper investigations. In some cases only repeated transfusions are given while in others incorrect hæmatinics is given along with the transfusions with discouraging results in both groups of cases. Treatment with proper hæmatinics alone would help to improve the blood picture in these cases without any further transfusions.

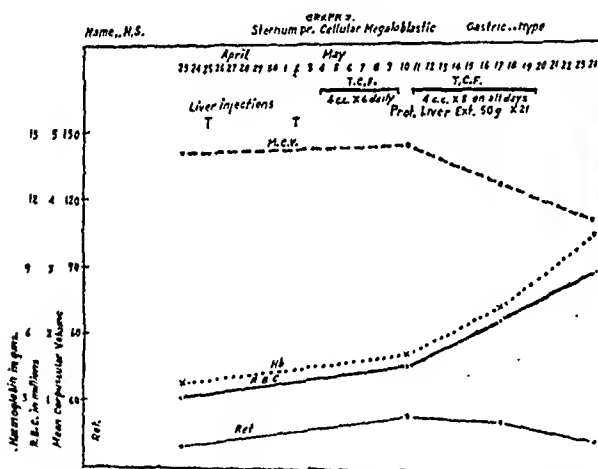
Case 8.—For over six months, the patient, Mrs. P. N., was treated with liver extracts of different brands along with repeated transfusions, having 14 transfusions in about six months, without any appreciable improvement. On admission examination of the blood and of the bone marrow revealed that the anæmia was dimorphic in type. Administration of iron alone was followed by rapid improvement of the blood picture, later administration of another course of liver extract improved the blood picture still further. The combined treatment helped to bring the blood values to about the normal level in a little over one month (graph 8).

Case 9.—On account of severe anæmia, N. S., male, 32, was given two transfusions of blood in about two weeks and a few injections

of liver extract of doubtful potency in inadequate dosage without any appreciable improvement. On admission into our hospital investigations showed that the patient was suffering from



macrocytic anæmia and had cellular megaloblastic marrow. Administration of potent liver extract in adequate dosage improved the blood picture in a short time (graph 9).



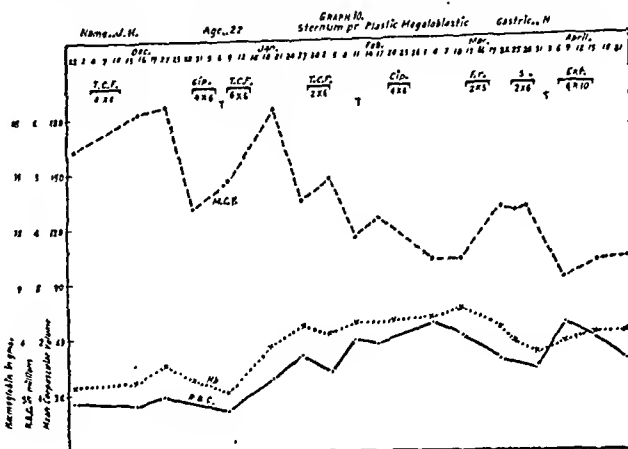
(f) *Refractory cases.*—Occasionally cases of macrocytic anæmia are seen which in spite of active megaloblastic marrow would not improve on liver extracts and multiple transfusions.

Case 10.—J. H., male, 22, was a case of macrocytic anæmia with cellular megaloblastic marrow and normal gastric acidity. The patient showed only slight improvement in spite of continued treatment with potent liver extracts and transfusions for about five months. Unfortunately, marmite could not be tried on this patient on account of non-availability of marmite. The patient left hospital and his subsequent history was not known (graph 10).

This case of macrocytic anæmia with megaloblastic marrow and normal gastric acidity closely resembles achrestic anæmia of Israëls and Wilkinson (1940), on account of its failure to respond to potent liver extracts.

B. Anæmia associated with some infection or infestation

(i) *Anæmia associated with kala-azar.*—Analysis of cases of kala-azar admitted under Dr. P. C. Sen Gupta, Kala-azar Research Worker, for the last two years, would show



that the anæmia associated with kala-azar is generally of mild to moderate degree (table II). Treatment of kala-azar with suitable drugs in adequate dosage is sufficient not only to eradicate the infection but to correct any mild to moderate degree of associated anæmia. In the few cases of severe anæmias administration of suitable hæmatinics along with the specific treatment or after a course of specific treatment may be required to bring the blood picture to the normal level. Transfusion of blood may be given with advantage to some of these cases not improving well with specific treatment and hæmatinics. But it must be emphasized here that non-improvement of the blood picture is, generally, an indication of non-eradication of the infection and would call for more vigorous treatment of kala-azar. Transfusion of blood has also been found to be very helpful in the treatment of cases complicated with cancerum oris, etc. But in cases of kala-azar, even with profound anæmia, transfusion of blood alone is absolutely of no value in improving the condition of the patient, as will be seen from the following case:—

Case 11.—S., male, 28, was treated with repeated transfusions and indifferent hæmatinics for over two months on account of severe anæmia with very little improvement. On admission into our hospital, examination of the bone marrow by sternal biopsy showed numerous Leishman-Donovan bodies. Subsequent treatment for kala-azar together with hæmatinics and transfusion of blood and plasma (given on account of hypoproteinæmia) helped to cure the patient (graph 11).

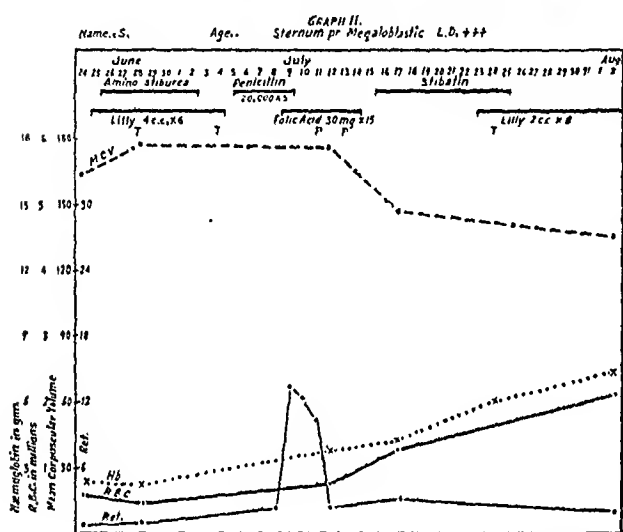
The patient was discharged shortly after the 1946 August disturbances without any further blood examination. He was seen after about two months when he appeared to be absolutely normal.

TABLE II

Level of red cell count	Number of cases	With transfusion number	Without transfusion number	RESULTS			
				With transfusion		Without transfusion	
				Improved	Died	Improved	Died
1,000,000 and below	5	4*	1	3	1	Nil	1
Over 1,000,000 and up to 1,500,000.	7	2†	5	2	Nil	5	Nil
Over 1,500,000 and up to 2,000,000.	8	1	7	1	Nil	7	Nil
Over 2,000,000 ..	60	Nil	60	..	..	60	Nil
All cases ..	80	7	73	6	1	72	1

* 3 cases with cancerum oris.

† 1 case with cancerum oris.



(ii) *Anæmia associated with malaria.*—Over 200 cases of malaria were treated by the Professor of Tropical Medicine (Dr. J. Lowe and Dr. R. N. Chaudhuri) during the last three years. It was noted that patients suffering from acute malaria, with parasite in the peripheral blood, usually do not show any marked degree of anæmia. Eradication of the infection with suitable antimalarial drug is generally sufficient to correct any associated anæmia as well. Any patient with severe degree of anæmia should, however, always be treated with suitable hæmatinic, according to the type of anæmia, along with adequate dose of any potent antimalarial drug. Ordinarily, transfusion of blood is not indicated in the treatment of anæmia associated with malaria, but transfusion of blood must always be given if examination of the bone marrow would show hypocellular marrow.

(iii) *Hookworm anæmia.*—Treatment with adequate dose of ferrous iron at the outset, irrespective of the degree of anæmia, deworming the patient with proper anthelmintic when the blood picture has been sufficiently raised by initial iron treatment, further course of iron, if required, to bring the blood values to the normal level, are required for properly diagnosed

cases of hookworm anæmia (Napier, Das Gupta and Majumdar, 1941). Even in the cases with very low blood counts, transfusion of blood would be superfluous as will be seen from an analysis of the cases given in table III.

TABLE III

Level of hæmoglobin	Number of cases	With transfusion number	Without transfusion number	Results improved number
3 gm. and below.	13	Nil	13	13
Over 3 gm. and below 5 gm.	24	Nil	24	24
Over 5 gm. and below 7 gm.	11	Nil	11	11
Over 7 gm.	9	Nil	9	9
All cases ..	57	Nil	57	57

C. *Anæmia associated with blackwater fever*

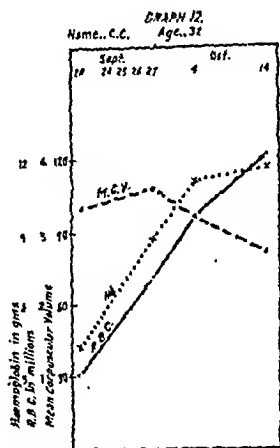
In cases of blackwater fever the blood values fall to very low levels within a very short time. In the majority of cases, with the cessation of the hæmolytic process, the blood values improve as rapidly as they fell, without the help of any hæmatinic or transfusion. Transfusion of blood must however be always given in cases where hæmoglobinuria persists for some days.

Case 12.—C. C., male, 32, was admitted with blackwater fever and severe anæmia. Hæmoglobinuria subsided within a day of his admission into the hospital and with it there was rapid improvement in the clinical and hæmatological conditions of the patient. Without any hæmatinic or transfusion, the blood values, from very low levels, reached almost the normal levels in less than four weeks' time (graph 12).

D. *Anæmia associated with aplasia of the marrow*

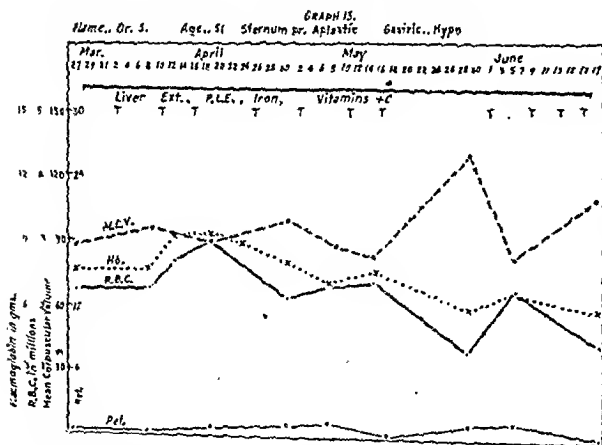
In cases of aplastic anæmias, diagnosed by sternal puncture, no treatment, not even

repeated transfusions along with all the known hæmatinics given together, would be able to improve the blood picture, and death generally follows in a few months. Exception is provided by the cases where aplasia of the marrow is temporarily produced by some severe infection, which is amenable to treatment as in cases of kala-azar associated with agranulocytosis. Aplastic nature of the marrow can only be detected by examination of the bone marrow and can seldom be inferred from



examination of the blood alone, however complete it may be. History of repeated attacks of malaria with insufficient treatment is given by some of the cases with aplastic bone marrow but malaria parasite has never been found either in the blood or in the bone marrow of any of these cases. In the absence of any post-mortem examination it is not possible to say if repeated attacks of malaria could lead to aplasia of the marrow in certain individuals.

Case 13.—Dr. S., male, 51, engaged in x-ray works, was admitted for treatment of anæmia.



Examination of the bone marrow showed aplasia of the marrow. Repeated transfusion at short intervals, once every week along with hæmatinics, failed to improve the blood picture and the patient died within three months (graph 13).

E. Anæmia associated with other disorders of the blood

(i) *Leukæmias*.—Transfusion of blood is of great palliative value in the treatment of bleeding in leukæmias but transfusion should not be used as a curative measure (Forkner, 1938). Castle et al. (1935) are of opinion that frequent transfusions provide only temporary benefit and is not associated with any change in the leucocytes.

In acute leukæmias, transfusion of blood may prolong life for a short time but repeated transfusions of blood have not been found to affect the course of the disease.

In chronic myeloid leukæmias, transfusions of blood may act as a valuable help when given in conjunction with judicious dose of x-ray. Transfusion of blood alone, however, is of little value in the treatment of these cases.

(ii) *Essential thrombocytopenia*.—Transfusion of blood is invaluable in combating any severe hæmorrhage, which is not infrequent in these cases. Jones and Tocantins (1933) claim to have cured a large number of cases with repeated transfusions given at intervals of 4 to 5 days. Transfusion of blood is also of immense value in the pre-operative stage or after operation (splenectomy), specially in the cases with any associated anæmia.

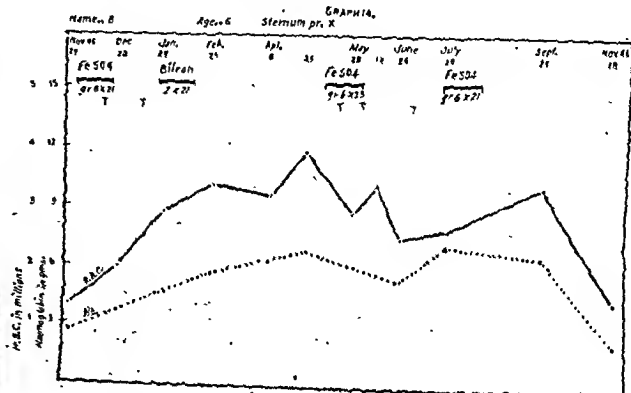
F. Anæmia of childhood

(i) *Type von Jaksch*.

(ii) *Type Cooley*.

Anæmia in both these types, specially in Cooley's type, is generally refractory to treatment with hæmatinics and transfusions. Transfusions of blood may, however, help to raise the blood counts temporarily, and repeated transfusions of blood along with hæmatinics may be helpful in some cases with severe anæmia.

Case 14.—B., female child, age 6 years, a chronic sufferer from anæmia from infancy, was admitted with a red cell count of 1,320,000 per c.mm. For about ten months the blood levels were kept moderately high with repeated transfusions and hæmatinics. With the cessation of treatment after discharge from the hospital both the hæmoglobin and the red cell count fell to very low levels within a short time and the patient died (graph 14).



Summary and conclusion

It has been shown that the treatment of anæmia varies from case to case and is dependent on the type and degree of anæmia as also on the underlying cause. The majority of the cases of deficiency anæmias were treated with hæmatinics alone without any transfusion. The percentage of improvement in the cases treated with hæmatinics alone, including the cases with very severe anæmia, was very high and was even higher than in the cases who had had transfusion as well. This was probably due to the fact that moribund cases and cases not responding well to hæmatinics were generally selected for transfusion. Comparing the rate of improvement in the cases of nutritional macrocytic anæmia showing rapid improvement with hæmatinics alone or in combination with transfusion, it will be seen that the rate of improvement was apparently of the same order in both the groups.

In the group of cases with infection or infestation, eradication of the infection with specific treatment was all that was necessary in most cases of malaria and kala-azar for the improvement of any associated anæmia, while combined treatment with iron and anthelmintic was essential for the treatment of hookworm anæmia of any degree. In the absence of any associated complications, *e.g.* cancrum oris in kala-azar, and in the absence of any severe anæmia, transfusion of blood is not generally indicated in the treatment of any associated anæmia in this group of cases.

Transfusion of blood, however, is a valuable adjunct in the treatment of any severe case of anæmia with hypocellular marrow and in the treatment of refractory cases, in conjunction with appropriate hæmatinics, and specific treatment for any associated infection, if there be any. It has been seen that if refractory cases of macrocytic anæmia with cellular megaloblastic marrow could be kept alive for a few months with hæmatinics and transfusions, some of them at least would respond later, and respond well, to the same hæmatinics which failed to produce any improvement in the earlier stages. Transfusion of blood has also been found to be a good supporting treatment in cases of essential thrombocytopenia and chronic myeloid leukæmia in combination with other therapeutic measures. But it is only of some temporary value in cases of Cooley's and von Jaksch's anæmias and of doubtful value in cases of aplastic anæmia.

Transfusion of blood alone will seldom, if ever, effect a cure in any case of anæmia enumerated above, whereas administration of the correct hæmatinic in adequate dosage and treatment of any associated condition, if there be any, will improve the blood picture of a very large number of these cases, including the cases with severe anæmia. Therefore, complete

cytological examination of the blood to determine the type and degree of anæmia, examination of the sternal bone marrow to find out the cellularity and the reaction of the marrow, and a thorough investigation to find out any associated condition, are essential pre-requisites in determining the mode of treatment of any case of anæmia, mild, moderate, or severe.

Acknowledgment

My thanks are due to Dr. J. B. Chatterjea, Assistant Research Worker, Hamatological Unit, I.R.F.A., for assistance in preparing the paper.

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THE EFFECT OF PROCESSING AND SOURING MILK BY THE INDI-GENOUS METHOD

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HEAT treatment of milk is a well-known and widely-adopted device for improving the storage life of milk either as such or before souring it. While in the West scalding or the more recent high-temperature short-time method of pasteurization is practised, boiling of milk is the time-honoured custom in India. Srinivasan and Banerjee (private communication) have shown that boiling for 10 minutes is more efficient than pasteurization in bringing down the bacterial count from over 100,000 to less than 100 per c.c. Anantakrishnan and co-workers (1943) have recorded the chemical changes occurring on boiling milk, and reported as a loss the contents of the skin formed on the surface of milk after boiling and cooling. But as the practice stands in the Indian household the skin is invariably utilized for making curd, butter or confectionery. In this paper the chemical changes on boiling milk for 10 minutes without allowing the skin to be formed, and the rise in the bacterial count of the processed milk with keeping have been recorded. Further, the processed milk has been soured with seed curd, and the multiplication of bacteria

during the process, and the count of the resulting butter and buttermilk have been studied.

Experimental

In order to study the growth of bacteria in processed milk on keeping 2 litres of freshly drawn buffalo milk were collected in a clean, steamed aluminium can in the dairy farm, brought to the laboratory and at once plated in standard nutrient agar. The milk was then set to boil in a tinned-brass vessel of 4 litre capacity over a Primus stove, and continuously stirred with a wooden ladle to prevent the formation of skin and residue as well as boiling over of the milk. The time lapse between milking and setting the milk to the boil was 1 to 1.5 hours. The milk was brought to boil, kept boiling (95° to $96^{\circ}\text{C}.$) for 10 minutes and then cooled to room temperature (23° to $25^{\circ}\text{C}.$), keeping up the stirring all the time, the total time thus taken for processing being 20 to 25 minutes. While repeating the experiment it was observed that the count of the boiled milk which was cooled in the open vessel as well as the rate of multiplication of bacteria on keeping the milk were considerably higher than those obtained when the boiled milk was at once poured into a conical flask, plugged with cotton-wool and then cooled. The experiment was therefore repeated both ways; and the processed milk in the conical flask was stored in a cupboard at room temperature (19° to $31^{\circ}\text{C}.$). The standard agar count was estimated at intervals of a few hours. The rises in the count on keeping are given in table I. In the same table the results of a similar experiment on pasteurized milk (Rep. Marketing of Milk in India and Burma, 1943) are entered for comparison.

In the above experiment the change in composition due to processing were also estimated by measuring the density (lactometer), fat (Gerber process), total solids, lactose and ash of milk (Woodman, 1941) before and after processing. The differences are recorded in table II.

The rate of multiplication of bacteria on souring was studied by seeding 2.5 per cent by volume of a homogeneously set curd of 1.0 to 1.1 per cent lactic acidity into a litre of buffalo milk processed as before. The flask was kept in an electric incubator at $40^{\circ} \pm 1^{\circ}\text{C}.$, and

TABLE I

Rise of bacterial count of processed milk on keeping

BOILED FOR 10 MINUTES		PASTEURIZED	
Hours after milking	Standard plate count per c.c.	Hours after milking	Standard plate count per c.c.
1.5	130,000 Boiled and cooled in the same vessel	2	225,000
		After pasteurization	
2	275 Stored at 17° - $25^{\circ}\text{C}.$ in flask plugged with cotton-wool	2.5 (bottled)	9,400
5	4,000	3	15,000
10	22,500	18 (returning from delivery)	121,000

Effect of cooling and storing in closed vessel

Fresh milk	360,000		
2	Boiled in tinned-brass vessel, and cooled in flask plugged with cotton-wool		
2.5	120 Stored at 19° - $30^{\circ}\text{C}.$		
7.5	2,600		

samples were plated at intervals until the acidity of the curd reached 1.2 per cent. It was then churned in an American bottle churn by adding an equal volume of water. The plate counts of the butter and of the buttermilk were also estimated. The resulting average counts are recorded in table III.

The standard agar count was—always estimated by the official method described in 'The Standard Methods of Examination of Dairy Products' (Amer. Pub. Health Assoc.,

TABLE II

Changes in composition of milk due to boiling for 10 minutes

Sample	Volume of milk, c.c.	Acidity, per cent	Density, $20^{\circ}\text{C}.$	Total solids, per cent	Fat, per cent	Lactose, per cent	Ash, per cent
Raw milk	1,100	0.09	1.0294	14.42	5.3	4.4	0.71
Boiled milk	875	0.11	1.0370	17.77	6.5	5.34	0.73
Boiled milk after correcting for reduction in volume.	1,100	..	..	14.14	5.2	4.26	..

1941). The standard agar count of each sample was averaged from 5 plates incubated at $37^{\circ} \pm 0.5^{\circ}\text{C}$. for 48 hours.

TABLE III
Rise in bacterial count of milk on souring at 40°C .

Hours after milking	Sample	Standard plate count per c.c.	Acidity, per cent
2	Fresh milk	566,000	0.1
2.5	Boiled for 10 minutes.	180	0.11
2.5	Boiled milk + seed curd.	2,240,000	..
5.5	Curd	84,000,000	0.78
8.5	Do.	256,000,000	1.19
	Curd was churned into butter		
	Butter	52,000	
	Buttermilk	Teeming at 1 : 100,000,000 dilution	

Discussion

It is clear from the figures in table I that bacterial destruction in milk is not only much more efficient with boiling for 10 minutes than with pasteurization but the rate of multiplication of organisms on keeping is considerably less in the former case. The bacterial quality of milk and, therefore, its keeping quality, is further improved by transferring the boiled milk at once into a closed vessel and then cooling it. The ease of operation and the needlessness of any elaborate or specialized equipment makes this method eminently suited for conditions obtaining in this country, where small-scale production in rural areas is the rule.

This type of processing, it will be observed from table II, reduces the volume by about 20 per cent, and raises the total solids by about 3.3 per cent, fat by 1.2 per cent and lactose by 1.1 per cent. The allowance is, however, made for the reduction in volume, a loss of 0.28 per cent of total solids, 0.1 per cent fat and 0.14 per cent lactose is observed. Kieferle and Gloetzel (1930) have similarly noted a slight loss in lactose—and proteins on boiling milk for 30 minutes. Gould (1945) has recorded a destruction of 25 to 30 per cent of lactose on still more rigorous (2.5 hours at 116°C . or 8 hours at 100°C .) processing.

In table III, apart from the quick rise in bacterial count with the progress in souring, the most significant fact is the uneven distribution of the bacterial population of curd between butter and buttermilk on churning: almost all the organisms pass into buttermilk leaving a very small fraction in butter, a fact also observed by Grimes (1923) and Hammer and Nelson (1940) in the creamery process. The low count butter produced by the indigenous method as described above compares very favourably with that produced under the best of conditions by the creamery process.

Summary

Milk boiled for 10 minutes and preserved in a closed vessel not only brings down the bacterial count more efficiently than does pasteurization, but the rate of growth of organisms on keeping it is considerably less than in pasteurized milk. The simplicity and efficiency of the method perfectly suits the small-scale village producer in India.

The rise in the plate count of boiled milk on souring has also been studied. On churning the curd almost all the organisms pass into the buttermilk leaving a very small number in butter.

My thanks are due to Mr. B. N. Banerjee and Professor V. Subrahmanyam for their kind interest in these investigations.

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BRENNER TUMOUR OF THE OVARY: REPORT OF TWO CASES, ONE IN THE WALL OF A SEROUS CYSTADENOMA

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BRENNER (1907) was the first to separate as a distinct entity the tumour which goes by his name. He called it 'oopheroma folliculare' but failed to recognize its true nature. In a diligent search of the literature Fox (1942) discovered that nine others, before Brenner, had been similarly misled. In retrospect, almost by a general consensus of opinion, Orthmann (1899) is given the credit for having described the first case of this neoplasia (Gaines, 1936; Novak and Jones, 1939; Geist, 1942). The present status of the Brenner tumour, however we owe to Meyer (1932) who described in detail its pathological characteristics, segregated it from the general mass of granulosa cell tumours and proposed for it a mode of histogenesis which still remains the most accepted one.

Pathologic anatomy

Gross characteristics.—The commoner variety is the solid one. The size may vary from a

microscopic nodule of typical cellular aggregates to a large mass as big as an adult's head. The largest solid tumour recorded so far weighed 15 pounds (Neiman, 1936). It forms a well-circumscribed nodular mass compressing the surrounding ovarian tissue but without a definite fibrous capsule. The consistency is firm. The cut surface is pale, avascular and like that of a dense fibroma; a yellowish tint, if present, is significant. In the larger tumours small discrete cysts with mucoid contents may be visible; the tendency to cystic degeneration or necrosis is, however, not marked (Novak, 1940). The less common type occurs as a solid nodule in the wall of a cyst. The solid nodule forms a small mass, a few cm. in diameter, and has the same appearance as that of an independent solid tumour. The cyst which bears the nodule in its wall may be either a pseudo-mucinous cystadenoma or a serous cystadenoma; the latter type is exceedingly rare. Geist (1942) believed that the cyst was formed by the coalescence of smaller cysts in a tumour originally solid. According to Meyer the cyst may be entirely independent and the Brenner nodule a separate development in its walls (Geist, 1942).

Microscopic characteristics.—Epithelial cell islets enmeshed in a fibrous groundwork form the characteristic histological picture. Both of these elements must be present to justify the diagnosis (Novak, 1940). The epithelial cell nests are composed of larger polyhedral cells with small oval vesicular nuclei. The peripheral rows of these cells may show a palisade arrangement. Danforth (1942) found that these nuclei have a peculiar 'tagged' appearance because of a tiny groove or fold traversing the longitudinal axis of the nucleus. He found the same structure for the nucleus of the epithelial lining of the pseudo-mucinous cystadenoma and further quotes Ivy who described a similar nuclear configuration for the Sertoli cells of the testis. But neither the appearance of the cells nor the nuclear pattern proclaim a highly proliferative activity for the neoplastic cells. There is a tendency for central cystic degeneration in these epithelial cell groups; the mucoid product that results takes the mucicarmine stain. In such a case the innermost lining of the tiny cyst shows nuclei placed away from the lumen—a point of distinction from the granulosa cell tumour. Yet another interesting feature is that the superficial layer in such cystic cavities may be transformed into mucoid columnar epithelium. The epithelial cells of the Brenner tumour contain glycogen but never lipid—another point of distinction from the granulosa cell tumour. The connective tissue component forms dense collagenous stroma surrounding the epithelial islets; no stromal elements can be demonstrated in between the epithelial cells. The stroma may occasionally show hyaline and calcareous degeneration.

Additional interesting features

Dockerty and MacCarty (1939) encountered a case of a Brenner tumour with an old corpus luteum at its lower pole, suggesting, as they remarked, that the 'ovarian function to this extent was not affected'. Plaut (1933) came across a miniature Brenner tumour in the torn wall of a lutein cyst. Rogers (1943) found in the literature records of four cases of Brenner tumour associated with pregnancy and he reported the fifth case. Abraham (1933) recorded one case associated with endometriosis. Fox (1942), among 170 cases of Brenner tumour in the literature, came across thirteen cases (7.6 per cent) in which the growth was bilateral. Johnson and Dockerty (1945) recorded the fourteenth case. Brenner tumour on one side may be associated with a different lesion in the other ovary: lutein cysts, fibromas, granulosa cell tumours and carcinomas have been described (Geist, 1942). A small proportion of pseudo-mucinous cystadenomas of the ovary have their origin in Brenner tumours (Novak, 1940). Meyer (1932) believed that serous cystadenomas of the ovary may have a similar origin. Novak (1940) remarked that a careful study of many supposed simple fibromas of the ovary would show them to be of Brenner variety.

Clinical characteristics

The most frequent age period for the Brenner tumour is after the menopause, beyond the age of fifty. Plaut (1933), Bland and Goldstein (1935), and Novak (1940) found that no genuine case of this neoplasm had been observed in a child. On the other hand, Geist (1942) stated that the Brenner tumour had been reported both in fancy and old age and further quoted Neumann as having cited a bilateral tumour in a child of five. The only symptoms and signs produced are those due to its size and its situation; there are no symptoms or signs that are pathognomonic. The disturbances of menstrual function or atypical uterine bleeding, described in some of the cases (Schiffmann, 1932), are due to the associated lesions (Novak, 1940). Ascites is occasional (Bland and Goldstein, 1935; Novak, 1940; Johnson and Dockerty, 1945), though Geist (1942) discountenanced this occurrence. Even Meig's syndrome has been described (Johnson and Dockerty, 1945) but would appear to be extremely rare. The general trend is to deny any endocrine influence for these neoplasms. Its growth is a very slow one and in spite of a few cases in the older literature suggesting recurrence (Tawildaroff, 1919) or malignant change (Voigt, 1903), apparently accepted by Bland and Goldstein (1935), the neoplasm is essentially a benign one (Novak, 1940; Geist, 1942).

Histogenesis

The histogenesis of the Brenner tumour has not been finally settled. The original conception

of Brenner (1907) that his 'oopheroma folliculare' was derived from the follicle of the ovary or the Pflüger's tubules and was therefore a specialized type of the granulosa cell tumour is no more accepted. Meyer's (*loc. cit.*) explanation that these neoplasms arise from the indifferent cells of the Walthard islets is the most accepted one at the present moment. It is interesting to recall that, in his original description of this neoplasm, Orthmann (1899) suggested this origin (Novak and Jones, 1939). Schiller (1934, 1936), on the basis of his microscopic studies showing a close resemblance between certain glands of the posterior urethra and the epithelial islets of the Brenner tumour and the abnormal persistence of the embryonic relationship between the rete ovarii and the epoophoron tubules in the hilum of the ovary, concluded that the neoplasm arose from the rete. Dockerty and MacCarty (1939) and Dockerty (1941) thought it to be one-sided development of a teratoma. Novak (1940) added yet one more possibility that the areas of epithelial metaplasia found not infrequently on the surface of the ovary in chronic perioophoritis may be the source of origin. Plaut (1933) believed that not all the so-called Walthard's rests were embryonic in nature; they could originate during life from the peritoneal epithelium.

Incidence

This interesting neoplasm would appear to be a rare entity. Meyer (*loc. cit.*) came across four cases in twenty years. Szathmáry (1933) found five cases among his material of 1,114 ovarian neoplasms. Novak (1940) came across 19 instances among more than 48,000 specimens. Within a period of forty years 20 Brenner tumours were encountered in the files of the Mayo Clinic (Johnson and Dockerty, 1945). Of the 500 solid ovarian neoplasms reviewed by Dockerty (*loc. cit.*) 2 per cent were of the Brenner type. Fox (1942) computed that about 170 cases had been reported so far. The *Quarterly Cumulative Index Medicus* recorded seven more cases up to the end of 1945.

From this country Gharpure (1941) reported a single case of a 'papillary fibroma inside the wall of serous cystoma, ? Brenner tumour of the ovary'. Menon and Veliath (1943) encountered a single case in their series of 204 ovarian neoplasms. Within a period of twenty-two years the writers have seen two cases.

Case reports

Case 1 (3371) R.—Solid Brenner tumour.

Clinical history.—A Christian female, aged 45, was admitted to the surgical side for pain in the abdomen. About three months ago she had an acute attack of severe pain in the right lower quadrant of the abdomen. Nausea accompanied the pain but there was neither any vomiting nor any rise of temperature. It was diagnosed as 'acute appendicitis'. It

subsided with rest and internal medication. Since then she was having similar but milder attacks off and on. Nausea, and a distaste for all kinds of food, accompanied the pain. Her menstrual period started at the age of sixteen; she had her last period a fortnight ago. The menses had always been regular, painless, and moderate. She had a single normal delivery; the child died when a year old. The only episode to note in the past history was an attack of frequency stools with passage of blood and mucus about twenty years ago.

Examination showed a well-built and well-nourished woman. Temperature 97.4°; pulse 78; and respiration 26. Abdominal palpation showed tenderness in the right iliac fossa; the McBurney's point was very tender. The other systems were normal. Examination per rectum showed the presence of internal hæmorrhoids. Examination per vaginam was not done. The laboratory investigations were all negative. She was diagnosed as a case of 'chronic appendicitis'. At the operation, the appendix appeared pathological and was removed. The right ovary showed the presence of a solid mass about the size of a small orange and this was excised as well.

The specimens.—The appendix measured 5 cm. in length. The surface showed a few congested blood vessels but there was no exudate, or adherent fibrous tags. On cutting, the walls were thickened. The mucosa appeared swollen. There was no hyperæmia of the mucosa but pinpoint ulceration could be made out at many places. The lumen was patent and there was no fæcolith. The histological study showed the features of 'chronic appendicitis'.

The ovarian mass (figure 1, plate XIII) weighed 65 gm. and measured $6 \times 5 \times 4$ cm. in the largest diameters. It formed a well-circumscribed mass with the external surface rough and nodular. The consistency was firm. On cutting no distinct capsule could be made out. Trabeculae of fibrous tissue could be seen running all over enclosing irregular lobules of greyish yellow tissue. In the centre the fibrous tissue was more condensed and here the cut surface had assumed a whorled pattern. The whole surface was pale and avascular. Careful examination showed a few very tiny mucoid-looking areas. No definite cystic excavations could be identified. Histologically (figure 2, plate XIII), nests of epithelial cells surrounded by whorls of fibrous tissue could be seen all over the section. The epithelial islets varied in size and shape. In general, the cells composing them were polyhedral or oval with pale vacuolated cytoplasm. The nuclei of these cells were oval and vesicular, with a definite nuclear membrane, and possessed darker violet nucleoli; there was no hyperchromatism and no mitotic figures could be identified. Some of the cell groups were solid; others showed degenerative changes in their centres. In these latter the centres appeared empty except for a little

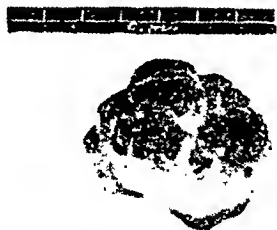


Fig. 1.—Case 1. Solid Brenner tumour: To show the external surface.



Fig. 2.—Case 1. Histological appearance. H.E., $\times 100$.



Fig. 3.—Case 2. Solid Brenner nodule in the wall of a multilocular serous cystadenoma.



Fig. 4.—Case 2. To show the lining of the serous cystadenoma. H.E., $\times 100$.



Fig. 5.—Case 2. To show the serous cystadenoma and the Brenner tumour. H.E., $\times 40$.



Fig. 6.—Case 2. To show the Brenner tumour. H.E., $\times 100$.

cellular detritus and were lined by cuboidal or flattened epithelium. Or, the central cells were distended and their nuclei lost; the cytoplasm of such cells appeared thin and translucent. In other cells the cytoplasm formed dense pink round bodies discarded from the cell wall. Some of these cell groups with marked liquefactive changes mimicked glandular patterns. In other portions the cells formed dense compact masses; here the cells appeared compressed and had assumed a columnar shape. Nowhere could be seen typical columnar cells of the goblet type with basal nuclei. The stroma was moderately cellular and was disposed to form whorls. It was condensed round the epithelial islets; quite frequently the stroma appeared as if it had formed a basement membrane to the epithelial cell groups. The stroma was avascular. As judged by the nuclear appearance the stroma cells were not highly proliferative. Hyaline degeneration could be made out in many places.

Case 2 (T/2033).—Brenner tumour in the wall of a serous cystadenoma.

Clinical history.—A Hindu female, aged 40, was admitted for a swelling in the abdomen—duration two years. The complaint started insidiously. About two years ago she had noticed, for the first time, a bulging of the lower part of her abdomen on the right side. There was no pain. The swelling had gradually increased in size to spread beyond the midline to the other side. There was no other abdominal disturbance. For the last six months she was getting irregular small rises of temperature off and on. Her menarche had started at the age of fourteen. The periods had always been regular, painless and the flow moderate in the amount. For the last two years the periods had become scanty and irregular, coming on every five or six months. The obstetrical history revealed a single normal delivery, eighteen years ago. There was nothing to note in the family history.

Examination showed the patient to be fairly well built and well nourished. Temperature 98°; pulse 80; respiration 22. Examination of the abdomen showed the presence of an intra-abdominal mass occupying the hypogastric and the iliac regions on both the sides and the lumbar regions on the right side. It was irregular in shape, and measured about 15 × 10 cm., with the greater part of its bulk on the right side of the midline. The consistency was elastic. It appeared to arise from the pelvis and was immobile in both the horizontal and the vertical directions. The swelling gave a dull note on percussion. The skin over the swelling was stretched but quite free. Examination per vaginum showed a small retroverted uterus quite apart from the abdominal mass. The latter appeared to be arising from the right ovary. There was nothing relevant to note in the laboratory investigations. At the operation, the mass was cystic and appeared to be in connection with the broad ligament on the

right side. It was excised without difficulty. The left ovary was normal and the peritoneal cavity did not contain any free fluid.

The specimen.—The mass (figure 3, plate XIII) weighed 2,670 gm. and measured 23 × 16 × 13 cm. The external surface was smooth and showed the stretched fallopian tube. There were a few prominent subcapsular veins but no papilliferous excrescences. The consistency was cystic all over except at one portion; here could be felt some elasticity and nodularity confined over an area of about 4 cm. in diameter. On cutting open the cyst was multilocular; the contents were serous fluid. The inner lining was smooth, and glistening except for a few raised patches greyish yellow in colour here and there (? lipoid deposits). There were no papillary excrescences. At one place in the wall was an oval nodule measuring about 4 × 2.5 cm. On cutting, the nodule appeared situated in the wall of the cyst. Its cut surface was greyish yellow and homogeneous. There was no naked-eye evidence of any cystic degeneration. Blocks were prepared from various portions of the cyst wall and also from the solid nodule. Histologically, sections from the wall of the cyst showed the structure of a serous cystadenoma (figure 4, plate XIII). This was separated from the Brenner nodule by a distinct band of connective tissue all round (figure 5, plate XIII). The Brenner tumour component had a structure similar to the one in the first case (figure 6, plate XIII). The central liquefaction was, however, more marked, producing many small cysts lined by a varying number of cell layers. Towards the centre again—away from the lining wall of the serous cystadenoma—the epithelial cell groups were more solid and here the cells tended to become squamous and a pavement effect was well seen. Nowhere could be seen any transition to goblet cells. The stroma appeared less cellular and less condensed than in the first case. Limiting the Brenner nodule on the other side—the side away from the serous cystadenoma—was compact ovarian stroma.

Comment

Brenner tumour by itself is an uncommon entity. About 30 per cent of the Brenner tumours appear as solid nodules in the walls of pseudo-mucinous cyst (Dockerty, *loc. cit.*). Their occurrence as solid nodule in the walls of serous cystadenomas is extremely rare. Frankl (1927) and Szathmáry (1933) have reported one case each. Novak and Jones (1939) did not find a single case in their large series and Dockerty and MacCarty (1939) had the same experience. On the other hand, Meyer (quoted by Novak, 1940) suggested that, like the pseudo-mucinous cystadenoma, serous cystadenoma may at times have its origin from the Brenner tumour.

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INCLUSION BODIES IN RICKETTSIA ORIENTALIS INFECTION

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THE observations of homogeneous, intracellular inclusion bodies in association with *Rickettsia orientalis* were made during an investigation of scrub typhus in Imphal in 1945 and were submitted in reports to GHQ(I). Twenty-five strains of *R. orientalis* were isolated from different sources. Similar observations have been made by Giroud and Panthier (1942) and Begg and others (1944) in association with classical typhus during the adaptation of mouse lung material to the lungs of rabbits.

When infected blood from patients or tissue material from mites or rats was inoculated in mice by intraperitoneal route in the first one or more passages the peritoneal exudate was thin, serous and abundant. In subsequent generations as the strain was established in the animal, the peritoneal exudate became sticky and very much reduced in quantity. During

this early stage of adaptation of *R. orientalis* to the new host, the following microscopic picture was observed in some of the animals, in the peritoneal smears stained with Giemsa stain.

The cytoplasm of the epithelial cells was extensively vacuolated and in some cells the vacuolation was present in the nucleus also. Some of the cells presented a distended appearance with vacuoles of various sizes and the nucleus pushed to one side. The majority of the vacuoles were filled with a homogeneous light pink material. Red inclusion bodies of various sizes and forms, but generally round and homogeneous in appearance, were scattered in the vacuoles and the cytoplasm. In some of the monocytes the inclusion bodies were present without any evidence of the vacuolation of the cytoplasm.

In the beginning the vacuolation was more extensive but the inclusion bodies were few. As passage proceeded, first there was an increasing number of inclusion bodies and a few typical rickettsia, later, the number of rickettsia increased, which appeared scattered at random in the cytoplasm of the cell, and the inclusion bodies became rarer. When the strain was well established fairly large clusters of rickettsia were present in the cytoplasm, and the peritoneal exudate was always sticky. But even at this stage the smears from the pleura showed a few inclusion bodies.

The above change from one stage to the other was generally gradual but sometimes sudden and occasionally a mouse even in 8th or 9th passage showed inclusion bodies. It was considered that this may be due to the use of mixed farm mice instead of the single strain breed. In order to verify it, WZ strain from Kalewa which was established in these mice was transferred in its 7th passage to Welcome mice, at the same time continued in the mixed farm. The first passage Welcome mice died after 16 days. The rickettsia were rare in the peritoneal smears, but there was marked vacuolation of the cytoplasm of the epithelial cells and inclusion bodies were present. The mixed farm mice passaged at the same time did not show any inclusion bodies and died after 12 days.

The second generation of Welcome mice died after 22 days and inclusion bodies though less were still present. In the third generation clusters of typical rickettsia appeared.

Later on the original stock of mice was exhausted and 8 strains that were being maintained for further experiments were passaged in a fresh batch of mice of unknown breed. Although the strains were by now established in mice the inclusion bodies appeared again but in very few animals and only for one generation.

The above picture was not presented by every strain, rather the majority of the strains showed typical rickettsia in the very first animal inoculated.

In guinea-pigs, the inclusion bodies were observed only in one animal inoculated with

tissues of bandicoots from Paungde in Burma. The other reactions observed in some of the animals were a marked preponderance of small lymphocytes in the peritoneal smears and the presence of mast cells of the cuboidal type. The rickettsia in these cases were generally typical though less in numbers and inclusion bodies were absent.

Summary

The inclusion bodies are considered to be a phase in the developmental cycle of *R. orientalis* during the stage of adaptation to a new host, but are characteristic of a few strains only.

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CIRRHOSIS OF THE LIVER IN THE ADULT*

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I PROPOSE to place before you an account of a few of my observations and those of others on the subject with a view to discussing the problem of cirrhosis of the liver and making out a case for planned investigation.

The subject of cirrhosis has been one of the prominent topics taken up by research workers for at least over a century. Work in India has been comparatively recent, but it has been very valuable. Much work is in progress in connection with infantile cirrhosis. Work on the adult type of cirrhosis also is in progress in India and outside India. This note is pointedly on cirrhosis in the adult. No reference to clinical and experimental work on infantile cirrhosis will be made considering that as a distinct entity. I am however not prepared to say that the result of researches on infantile cirrhosis will not be able to elucidate some problems of cirrhosis in the adult.

Definition.—There will be little to gain by introducing two different terms, cirrhosis and sclerosis, as such a grouping may make the confusion worse confounded. Ramchandra Rao (Rao and Radhakrishna Rao, 1938) suggested the two groups—cirrhosis and sclerosis; but some critics who followed him have not favoured this grouping.

For the present discussion let me then use the single term cirrhosis to embrace all conditions of the liver where fibrous tissue develops in excess, involving a very wide range of factors proved or not proved to be concerned in the completed picture of the cirrhosis, keeping out the gummatous or syphilitic livers and livers in

decompensated cardiac conditions, and possibly a few other conditions.

Literature.—On cirrhosis in the adult are summarized below in brief the contributions by workers in India in chronological order.

Hughes (1933) mentions 241 cases of cirrhosis of liver among 7,911 admissions to medical wards between 1929 to 1932 in the Punjab. He reviews 30 cases of fully established portal or multilobular cirrhosis; three of these had died in hospital and autopsy had been performed on only two. Special stress is laid on the part played by malaria in the causation of the condition.

Radhakrishna Rao (1933), following up his work singly and with Tirumurti on ascites in South India, presents a detailed clinical study of 64 cases, two of which were verified at operation and 12 at autopsy, all these cases were associated with ascites and were called by the author decompensated portal cirrhosis. In addition to this the author presents analyses of 21 cases without ascites. Without reproducing the figures of analysis I may say that the series embraces a wide range of conditions such as gummatous hepatitis and splenic anaemia. The age incidence of these 64 cases shows the highest incidence between 30 and 40.

Bhaskara Menon and Annamalai (1935) give an account of incidence of hepatic cirrhosis in South India. In this analysis the highest incidence is in the age group 30 to 40. The incidence of cirrhosis of liver as worked out from autopsy figures has been stated as 4.39 per cent. This paper refers to work on non-alcoholic cirrhosis in India and quotes Tucker (1908) ascribing it to malarial infection and Rogers ascribing it to amoebiasis possibly. The paper contains an interesting discussion on the origin and nature of the fibrosis.

Tirumurti and Radhakrishna Rao (1936) present a study of livers with a view to determining the rôle of malaria in causation of cirrhosis of the liver. They conclude that *per se* malaria is not a direct cause of the cirrhosis of the liver.

In all the above references the title cirrhosis has been used as an omnibus one, embracing all conditions wherein the liver is the seat of fibrosis. Few attempts have been made to throw light on aetiology or genesis of cirrhosis.

Radhakrishna Rao (1936) gives his findings on cirrhosis of liver following chronic intoxication with carbon tetrachloride using rats, rabbits and guinea-pigs as experimental animals. The findings are interesting.

Tyagaraja (1937) has discussed the early pathological changes in the liver in the tropics with special reference to cirrhosis. This study is based on 73 livers.

Incidence.—Incidence of cirrhosis of liver has been variously worked out. Rogers (Rogers and Megaw, 1930) states it as 6.9 per cent for Bengal, Tirumurti and Radhakrishna Rao (1934) 9.3 per cent for Vizagapatam, South India, Bonne

* A paper presented at the 34th. Indian Science Congress, January 1947, Delhi.

et al. (1931) 6.9 per cent and 5.8 per cent for Dutch East Indies, Tyagaraja (1937) 5.6 per cent for Ceylon and Gharpure (1928) 2.01 per cent for Bombay. The concluding remarks in the last paper were: 'Thus from the records available here much light cannot be thrown on any newer conception of cirrhosis of the liver'. To-day nearly eighteen years since these lines were written the position has remained unaltered at least to me.

Hall and Morgan (1939) give an account of 68 autopsies of confirmed cases of cirrhosis of liver from 13,000 autopsies. Jaundice was noted in 50 per cent of the cases, ascites in 60.3 per cent, hæmorrhage in 30.3 per cent and fatal hæmorrhage in 20 per cent. Correct clinical diagnosis was made in 36 cases or 52.9 per cent. Weight of the liver—highest 2,760 grammes, smallest liver 1,400 grammes. Spleen average weight 360 grammes (double the weight of the normal approximately). Liver smooth to granular in 40 (61.5 per cent), roughly granular nodular in 25 (38 per cent). Histology—relative fibrosis slight in 3, moderate in 14, marked in 32, extreme in 19. All the cases in which the W.R. was positive fell in the last two groups. Fibrosis was mainly periportal and was classified as cellular, moderately cellular and firm fibroblastic. Cellular infiltration of the periportal connective tissue has been noted and also necrosis of the liver cells and fatty infiltration noted. The ætiological factors are discussed.

In a series of 10,000 autopsies examined by me there is a total of 226 cases in which the liver has been the seat of cirrhosis, including one of infantile cirrhosis. There are two cases of cardiac cirrhosis in congestive cardiac failure. In the whole series 21 cases of congestive cardiac failure have been recorded and cardiac cirrhosis occurred only twice in them. I am therefore not inclined to separate these two cases as a distinct group. Of the 225 cases, 23 are associated with ulcers in the colon, all declared on anatomical ground as amœbic. There is a total of 1,164 cases of dysentery in the whole series. Of these 54 are bacillary, acute and chronic. Bacillary dysentery was diagnosed for the first time only in 1907 and the cases of this series commenced from the beginning of 1882 and ended on 9th July, 1945. Of the 1,110 cases of amœbiasis, 44 are chronic showing thickening of the bowel, strictures, healing, etc., 23 of these, *i.e.* over 50 per cent, have cirrhosis of the liver. Thus the rôle of amœbiasis in relation to cirrhosis of the liver needs consideration. As regards the relation of malaria to cirrhosis my findings do not indicate a direct relationship. There are only four cases wherein these two conditions co-exist. Kala-azar has been recorded twice associated with cirrhosis. However, I am not qualified to speak on this subject, this part of India not being an endemic area. There are 13 cases of gummatous or other kinds of syphilitic livers, and one each of cholecystitis and of carcinoma of ampulæ of Vater. There

are left 178 cases of cirrhosis with no causative agent that one can even surmise. Incidence of the bulk is 2.25 per cent and of the selected ones 1.79 per cent. At least judged from post-mortem data, cirrhosis of the liver is not such a frequent condition in Bombay.

Associated infections, etc. :—

Ulcers, intestine	..	..	23
Abscess, liver	..	..	2
Peritonitis	..	..	2
Pneumonia	..	..	1
Congestive cardiac failure	..	..	2
Bronchiectasis	..	..	1
Arteriosclerosis	..	..	1
Renal dwarfism	..	..	1
Tuberculosis lung	..	..	9
Carcinoma pancreas	..	..	1
Chronic gastritis	..	..	1
Cholecystitis	..	..	1
Kala-azar	..	..	2
Malaria	..	..	4
Syphilis	..	..	13
Carcinoma liver	..	..	5
			<hr/> 69

Other findings :—

Ascites	..	..	35
Jaundice	..	..	11
Hæmorrhage	..	..	6
Ascites and jaundice	..	..	3
Pleural effusion	..	..	3
Pericardial effusion	..	..	2
			<hr/> 60

Age incidence :—

11-20	..	..	26
21-30	..	..	66
31-40	..	..	55
41-50	..	..	33
51-60	..	..	18
61-70	..	..	6
71-80	..	..	3
Unrecorded	..	..	18
			<hr/> 225

In 18 cases age has not been recorded, but the body has been described as that of an adult male or female. If the figure is included in age groups 21-40 then a total of 139 cases occur between 21-40. One meaning of a late age can be a protracted course of development of the fatal picture of cirrhosis.

Sex incidence.—There are 23 female cases in the group of 225.

Weight of the liver.—Standard weight for an adult is taken as 1.2 to 1.6 kg., or 1/36th of the body weight. Lowest weight recorded is 210 mg. in a male aged 65 and the highest 4,550 gm. in a male aged 32. Weights have not been recorded in 123 cases.

Under 600 gm.	..	6
Between 600 and 1,200 gm.	..	69
Between 1,200 and 1,600 gm.	..	19
Between 1,700 and 2,200 gm.	..	7
Above 2,200 gm.	..	1
		<hr/> 102

Small livers are comparatively few. The body weights have not been recorded in all cases, hence no attempt is made to work out the ratio, liver to body weight.

Weight of the spleen.—The upper limit of a normal spleen is taken as 150 gm. and spleens weighing 180 and above are called enlarged.

Up to 600 gm.	..	61
Between 600 and 1,200 gm.	..	16
Between 1,200 and 1,800 gm.	..	6
		<hr/> 83

The highest is 1,750 gm. In 19 cases of cirrhosis of the liver the spleen has not been enlarged and weights have been between 50 gm. and 150 gm.

The weight of the spleen does not appear to bear an inverse relation to that of the liver. Cases in which the spleen weight is below 150 gm. the liver weights have been 700 to 1,000 gm. It is more probable that splenomegaly is marked when the liver has not undergone extreme reduction in size.

Degree of fibrosis.—The histological picture falls in one of the following three general groups (excluding gummatous livers):—

1. Necrosis of groups of cells with little, moderate to extreme fibrosis.

2. Universal fatty metamorphosis of cells and marked to extreme fibrosis.

3. Fairly well preserved cells with inflammatory cell infiltration interrupting the pattern.

In 1 and 2 the livers are small and in 3 they tend to be large. In my opinion much cannot be gained by classifying it as slight, moderate, excessive, extreme, etc. What is more useful is to correlate the extent of the damage to the liver cells. The extent of cell infiltration in the portal tract or around lobules or within the lobule is more helpful. Tyagaraja (1937) has given an interesting account of such livers. In all these there is no cirrhosis and the damage to liver cells minimal if at all. Could these conditions be precursors to cirrhosis? Then there are two problems—(1) beginning with hepatitis (interstitial) and (2) beginning with necrosis of liver parenchyma and degeneration of the cells.

Morbid anatomy studies with post-mortem material have not been helpful.

A few dozen biopsies have been studied in this institution such as those that have shown the histology of one single phase in the history of a diseased liver. My colleague, Dr. J. G. Parekh, has been obtaining these biopsies whenever possible. This has not been helpful beyond diagnosing an occasional case.

Nine recent autopsies done by me in cases of infective hepatitis showed some degree of replacement fibrosis and necrosis of the liver parenchyma. In the autopsy records in my department there are 23 post mortems on cases of subacute atrophy of the liver. In these again varying degree of developed fibrous tissue is visible. These two groups may be similar if not the same.

To connect the histology in fibrosis and its antecedent conditions a few facts regarding the structure of the liver may be noted here.

1. The liver cells on the one hand and the endothelial and kupffer cells on the other are separated by a delicate collection of collagen layer. This area shows an occasional fibroblast and lymphocytes. It is the collagen layer that gets separated in serous hepatitis. This is considered to be an evidence of the mildest degree of damage to the liver.

2. The portal canal is a connective tissue structure with a collection of lymphocytes, mononuclear cells and fibroblasts. This is poor in collagen. The cell and collagen content increases with age. The above two have an important bearing in interpreting the early histological changes toxic or otherwise.

Injurious agents are of two types—(1) soluble in blood and (2) insoluble in blood, and the routes by which they reach the liver are varied. They may be by portal vein, hepatic artery or bile ducts, hence the nature of the damage varies. Necrosis as it is noticed, therefore, can be focal, zonal, central, mid-zonal, and peripheral.

The focal necrosis is explained to some extent by Mallory as a combined effect of the wandering cell emboli and bacterial poison. The zonal necrosis briefly stated is not satisfactorily explained—two suggestions are put forward. Selective actions of hepatic cells and possible difference in the functions of cells anatomically classified central, mid-zonal and peripheral.

A brief summary of the causal factors is as follows:—

1. Alcohol addicts 5 to 6 per cent develop cirrhosis. 25 to 35 per cent cases of cirrhosis give history of alcoholism.

2. Deficiency of dietary constituents—carbohydrates, vitamin B, choline and protein.

3. Infections.

4. Hepato-toxic agents.

No single agent is responsible for the complete picture of cirrhosis. The rôle of formation of fibrous tissue and sequence in which it occurs require a careful study. Is it a phenomenon subsequent to the action of a number of factors acting concurrently or in succession producing damage? Then all fibrosis in the liver is a replacement fibrosis.

Is there anything like interstitial hepatitis in the absence of damage to liver cells?

What are the factors responsible and may not these necessarily be causal factors for fibrosis and for the progressive destruction of liver cells?

Are there two distinct groups—(a) factors that lower the resistance of cells and (b) factors that attack the vulnerable cells and effect necrosis—the antecedent to replacement fibrosis?

Thus the problem becomes complex but a rational plan of investigation is possible, detection of damage to cell from its initial stage and through the evolution of the condition, progressive or regressive, by (i) Chemical test—hippuric acid synthesis test suggests itself. The normal synthesis is said to require the whole intact liver. (ii) Bacteriological study. (iii) Histological study by repeated biopsies.

The few experiments done by my colleagues in my laboratory attempting to produce cirrhosis have failed, maybe due to our technical defects. Vacuolation of liver cells comparable to fatty changes has been produced but not cirrhosis. Animal experiments may be very interesting but the all important question will arise in the end: Can the findings be applicable to the disease condition—or process as it occurs in man? Hence my plea for intensifying clinical research. The understanding of the subject of cirrhosis will only be possible if repeated efficiency tests and repeated biopsies were possible and undertaken over a reasonable period in addition to critical clinical study.

Since my writing this note a very interesting paper by Dr. P. N. Wahi, M.D., M.R.C.P., on Study of Liver Disease has appeared in the *Indian Medical Gazette*, Vol. LXXXI, No. 11, November 1946.

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SCRUB TYPHUS IN NORTH BURMA

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NEARLY 100 cases of scrub typhus were treated in an Indian General Hospital at Meiktila from May to November 1946. Peak of admission

rate was noticed in August and November. A rise in the incidence of scrub typhus had been noticed a fortnight after a heavy shower of rain. Vast stretches of uncultivated land filled with scrubs and wild grass is a feature of Meiktila and places round about. The incidence amongst the Burmese, Indians and Japanese troops was equal although proportionally there had been a low incidence amongst British troops, which might be due to less troop movements and avoidance of scrub, etc. The disease was mild amongst Burmese, of moderate severity in Indian and most severe amongst British troops.

Incubation period.—It was not possible to determine it as we could procure neither the history, nature, time of the mite bite nor the associated troop movements. The patients came under hospital care on the fourth or fifth day of fever.

Age incidence.—Majority were between 20 and 30 years though a few occupied the lower limit of 20, and very few, if any, at or above 40.

Nature of fever.—Patients were referred to the hospital on the fourth day of fever. Severe headache and pain in the lower limbs was a common complaint. The initial rise of temperature was usually in the region of 102°F. and 103°F., and the fever remained remittent with daily remission of 1 to 1.5°F. The highest temperature recorded during the course of the disease was 104°F. The febrile period was between a minimum of 12 days and maximum of 26 days, though the majority had temperature only for 18 to 20 days. In a few, the temperature lasted up to 40 days, in whom invariably secondary bronchitis was the prolonging factor. The temperature chart during the first and early part of the second week of fever had not the slightest resemblance to that confronted in typhoid (step-ladder like). The temperature touched normal by lysis and on an average took four days to do so. With the temperature touching normal the patient was on the road to uneventful convalescence, and complete recovery. No recrudescence of fever was noticed. A small percentage of cases had malaria to start with which showed appropriate alterations in the temperature. The temperature in these cases did not abate on antimalarial treatment. Majority of them had bronchitis to start with though a few developed it during the third week of illness. One patient had a pneumonic onset of fever with cyanosis, hurried respirations and positive chest signs.

Pulse.—On an average the maximum recorded pulse at the height of fever was between 100 and 110 per minute, bradycardia in comparison to temperature, but was not dicrotic. The blood pressure was taken during the second week of illness, systolic was between 100 and 110 mm. Hg. and diastolic 50 to 70 mm. Hg.

Main symptoms and signs.—The facial expression of the patient at the end of first week of fever was highly characteristic being dull and lethargic. All of them looked doped, with

eyelids half closed. Patient could be hardly roused, cerebation was slow and hands were tremulous. The tongue was dry and coated (dehydration). A small percentage exhibited a low muttering delirium at the end of first week of illness. Asthenia was a prominent feature.

The abdomen was soft and yielding. The bowels were constipated. The spleen was palpable in many, though no importance could be attached, as most of them had suffered from malaria.

Eschar.—Often noticeable by the sixth day of fever as a circular moist ulcer which healed by leaving a black scar of 1 cm. diameter and dropped off during convalescence, leaving no marks behind. Serotal, inguinal and axillary eschars were most frequent, though in a few typical ones were located in pre-auricular region and pit of stomach. About 40 per cent of the cases only showed the eschar.

Adenopathy.—Lymphatic glands draining the eschar were always enlarged, discrete, soft and tender. They were usually of peanut size ($\frac{3}{4}$ inch diameter), marble size was sometimes reached as was seen in the case of a pre-auricular eschar. Regional adenopathy was followed by generalized adenopathy in a couple of days, the cervical and inguinal chains being the most common. Generalized enlargement of glands was noticed in cases showing no eschar. The glands retrogressed and were not palpable at the close of convalescence.

Rash.—Rash was never observed in the Indian troops. Macular type of rash was seen in two British and one Japanese patients. Rash was observed in a Burmese, distributed over the face, chest, abdomen, and flexor surface of limbs and was mistaken for measles. Rash was observed at the end of first week of illness.

Deafness.—Deafness was complained of by majority of patients on the tenth day of fever, quite marked in some. It cleared up with the onset of convalescence.

Laboratory data.—1. In 31 per cent of patients the total leucocyte count was between 4,000 and 5,000 whilst in the remaining it was up to 10,000 per c.mm. In very small percentage of the latter group a total count of 18,000 was recorded. They had either a superimposed bronchitis or broneho-pneumonia. Lymphocytes ranged between 40 and 46 per cent of the total leucocytes and were of mature type.

2. Blood and urine cultures carried out during the febrile period were sterile and no pathogens were isolated from stool cultures.

3. Blood sedimentation rate was raised 60 mm. at the end of first hour (Westergren method) during the active phase of disease and early part of convalescence. Returned to normal after nearly two months of convalescence.

4. C.S.F.: No pathological changes were seen. Culture—sterile.

5. Serological findings:—

(a) Kahn tests, 15 per cent of them, were positive during the active phase of disease

which turned to negative during convalescence except in a few who had either been treated for syphilis or gave a history of having had a sore.

(b) Aldehyde and Chopra tests were negative in all of them.

(c) Widal and Weil-Felix reactions. During the first week of fever a titre of 1/160 to 1/320 in T₀ was observed in majority of cases which showed a decrement in the second and third weeks of fever when OXK began to show a diagnostic titre of 1/320 and above. There was no appreciable rise in OXK titre in the first and early part of second week of fever. A diagnostic titre of 1/320 to 1/640 was recorded between the 12th and 14th day of fever. Maximum titre of 1/5120 to 1/20480 was recorded either at the beginning of third week of disease or early in convalescence. OX19 and OX2 did not rise above 1/40 in most of the cases. In extremely toxic cases the diagnostic titre was not obtained till late in the disease and these cases gave the highest titre in convalescence (1/20480). An OXK titre of 1/320 (Felix method) and above either in the course of the disease or during convalescence was taken as the diagnostic titre. A titre of OXK below 1/320 was recorded in fevers other than scrub typhus. One amongst the lot had been inoculated against scrub typhus. He had a mild attack and agglutinins against OXK did not rise over 1/320.

It is worth while to point out that sera of persons inoculated against scrub typhus tested against OX2, OX19 and OXK suspensions weekly for two months after the last prophylactic dose gave a maximum titre of 1/40. We had trouble with OXK suspensions as they were unstable. Periodical checking of the suspensions against negative and positive sera could only overcome this difficulty. Turbid and brownish suspensions are to be discarded.

Complications.—Two cases simulated acute abdominal conditions like subphrenic and appendicular abscesses. Some developed broncho-pneumonia. Fifteen per cent had malaria to start with. The most fatal complication noticed was hiccough in three patients who succumbed to it. The hiccough was of toxic origin as P.M. examination showed neither dilatation of stomach nor peritoneal involvement. Their blood urea was within normal limits.

Sequelae.—Patients were extremely asthenic. They had a ravenous appetite. Convalescence was uneventful and patients put on considerable weight. Only one developed (Adi Kundu) peripheral neuritis and his convalescence was prolonged. The temperature in his case had touched normal on the 42nd day.

Mortality.—There were three deaths due to scrub typhus during the six months which worked out at 4 per cent.

Diagnosis.—During the first week of fever scrub typhus had to be distinguished from typhoid, salmonella fevers, measles, septicæmia,

(1)

(3)

(4)

*None in Indians.

† Bronchitis excluded.

† Diagnostic titre

subacute bacterial endocarditis and cerebro-spinal fever. The presence of a typical eschar with regional and general adenopathy, the characteristic doped look of the patient with eyelids half closed, a normal leucocyte count or a leucopænia with relative increase of lymphocytes associated with sterile blood, urine and C.S.F. cultures are highly suspicious of scrub typhus in an endemic area. Sometimes general adenopathy with rash was confused with secondary syphilis. The glands are tender and Kahn test negative in typhus (Japanese). Diagnosis is usually confirmed in the second week by the appearance of diagnostic titre in OXK in the serum of the patient. A rising OXK titre had been accepted as diagnostic.

Treatment.—Efficient nursing had reduced the mortality rate to a great extent. Attempts to dilute the toxins and prevent dehydration by intra-gastric and intravenous drips of glucose saline had saved the lives of many. Fresh lime juice and multivitamin tablets were given as a routine. Penicillin and sulphonamide drugs were tried with no benefit, except when complicated by broncho-pneumonia (in the case of Errington). Hiccough developing in the third week of fever does not respond to symptomatic treatment.

Histological picture.—One of the autopsy cases is outlined below :—

Lymph gland.—Congested. The endothelial lining of the sinuses was swollen and desquamated. Numerous large mononuclear phagocytes could be seen.

Heart.—Muscle fibres were swollen and structureless with evidence of fragmentation. Considerable oedema present. Fair degree of diffuse infiltration of round and plasma cells seen, occasionally being perivascular. Subpericardial round cell infiltration noticed.

Lungs.—Marked hyperæmia of the alveolar capillaries with hæmorrhages into the alveoli. Many pigmented macrophages seen. The alveolar septa are thickened by oedema, congestion and inflammatory cells. Capillary hæmorrhages were observed.

Liver.—Columns of liver cells swollen, granular, with vacuolation in central zones. Marked round cell infiltration seen in the portal tracts, not perivascular in distribution, extending between liver cords.

Kidneys.—Marked hyperæmia of the glomeruli and inter-tubular capillaries seen. The glomeruli were swollen and more cellular than normal. The tubular epithelium showed degenerative changes, being swollen and granular. The lumina contained albuminous debris.

Cerebrum.—Generalized capillary congestion and marked oedema noticed. Focal collections of mononuclears, lymphocytes, some glial cells, mostly perivascular, seen in the subcortical white matter. General increase in cellularity of mononuclears and lymphocytes seen.

A tabulated chart containing main clinical and serological features seen in 68 scrub typhus patients is included.

My thanks are due to Colonel A. M. Chaudhury for his encouragement and to my laboratory staff who had ungrudgingly helped me in carrying out the necessary investigations.

TREATMENT OF TYPHOID FEVER WITH PENICILLIN*

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BETWEEN October 1945 and November 1946 my opinion was requested in the treatment of seven critical cases of enteric fever under the grip of severe septicæmia. Of these 4 were Hindus, 2 Muslims and one Indian Christian. Five belonged to the male and two to the female sex. The ages of the male patients ranged between 16 and 40 years and of the female patients one was aged 18 and the other 25. All of them were seen between the 3rd and 4th week of illness. Widal reaction was positive in all of them; O agglutination 1 in 125.

In all these cases the pyrexia varied between 104°F. and 105.4°F. They were all in the stage of coma vigil—unconscious with eyes half open having low muttering delirium. There was carphology and subsultus tendinum. Their tongue was coated with heavy creamish white fur, the tip and borders of which were angry looking. Their pulse rates were between 140 and 150 and rates of respiration between 34 to 44 per minute. Their conjunctivæ were injected—their abdomen tumid and they were all passing liquid stools 4 or 5 times and urine 3 or 4 times a day involuntarily in bed. Before I was called in they were having hydrotherapy, phage and vitamins internally and 25 per cent glucose intravenously 50 or 100 c.c. daily according to the needs of the cases.

Unfortunately in all these cases with this line of treatment there was no improvement. Obviously I was consulted to suggest some remedy that might prove effective and check the course of the illness.

The first of this series was a Hindu girl aged 18 years. In addition to the signs and symptoms described above she had bronchitis with a W.B.C. count of 7,000 per c.mm. and neutrophils 76 per cent. There was slight normocytic hypochromic anæmia. As the patient had bronchitis, I tentatively advised 30,000 units of penicillin intramuscularly every 3 hours just to watch its effect on the bronchial tubes. I was agreeably surprised to find that by the time 90,000 units of penicillin were injected the delirium was replaced by sound sleep and there appeared droplets of perspiration like dew-drops

* Being a paper read before the British Medical Association, Calcutta Branch, in December 1946.

all over the forehead. The temperature also was one degree less. There was not much improvement about the condition of the bronchial tubes at this stage. This line of treatment was therefore continued and the fever broke by crisis. The temperature became subnormal after she had received 300,000 units of penicillin. The facies of the patient remarkably improved and her general condition became better. She talked coherently and the bronchitis disappeared. Penicillin was therefore discontinued. The temperature remained normal for 18 hours and then gradually started rising till it reached 101° in the course of next 12 hours and then fluctuated between 101°F. and 100°F. for a day. Further injections of 210,000 units of penicillin in same dose and same interval were given as before. Within 24 hours the temperature became subnormal and the patient entered into convalescence. Thenceforward the disease disappeared leaving only one complaint, *viz*, moderate tympanitis. It took about a fortnight for the tympanitis to disappear.

Encouraged by the good result of penicillin in this case, I advised the other patients of this series similar line of treatment with more or less identical results except in 2 cases. The first case was the last but one case of this series, a Hindu boy aged 16, who was seen by

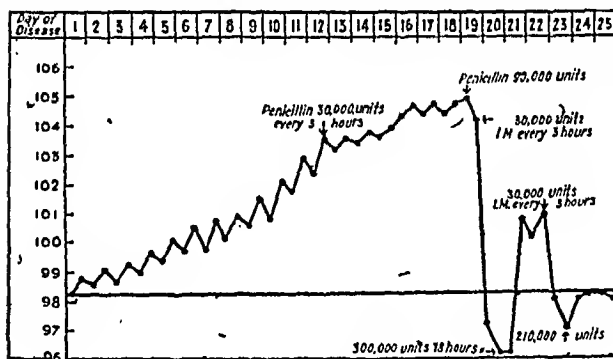


Chart 1.—Case 1.

me on the 24th day of illness. The patient was restless and violent with meningismus. Lumbar puncture was done, fluid came out with pressure but in all other respects it was normal and culture showed no growth. In this case I suggested pushing in of penicillin by continuous intravenous drip method, failing which by the continuous intramuscular drip method. As neither of these methods was allowed by the patient's relations, I therefore advised as the last alternative high doses of penicillin. 60,000 units were administered intramuscularly every 3 hours. Altogether 660,000 units were given after which perfect convalescence was established. In this case also meteorism continued to trouble the patient for nearly a fortnight after which he was in all other respects completely normal.

The second case was the last case of this series, an Indian Christian girl aged 25, who developed broncho-pneumonia in the 3rd week

of enteric fever. Penicillin 60,000 units were given intramuscularly every three hours along with 100 c.c. of glucose, oxygen, strychnine, atropine, coramine, cardiazol, ephedrine, etc., but nothing was of any avail and she succumbed

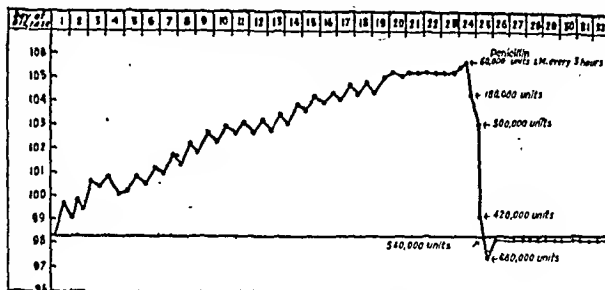


Chart 2.—Case 6.

to peripheral circulatory failure on the 2nd day of penicillin treatment.

Commentary.—1. It is true *in vitro* it has been proved that penicillin is useless in destroying *Eberthella typhi* but in clinical practice as reported above it has been found successful in six out of a series of seven proved cases of typhoid infection. Obviously the number is far too small to warrant any opinion about the success of this drug in the treatment of typhoid fever. Nevertheless from the case reports it would appear that penicillin is well worth a trial in the treatment of enteric fever.

2. The continuance of distension of the abdomen after convalescence has been established is probably due to slow healing of ulcers in the Peyer's patches after quick defervescence. How the abdomen would behave if penicillin were administered early in the disease remains to be seen from future case reports.

3. It may be held that in the cases reported above the good result of penicillin was due to its action on secondary infection with other organisms for example *Streptococcus hemolyticus*. But it will be futile to argue in this vein as blood cultures in all these cases except in the first showed no growth of streptococcus or any other organism. In the first case blood culture was not done.

ISOLATION OF OESTRONE FROM THE URINE OF A CASE OF FEMINISM*

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A REPORT on the biochemical investigations carried out by us on a case of feminism in a young adult male was published in the May 1947 issue of this journal. Part of this work included a study of the urinary steroid excretion.

* Read at the Physiology Section of the 34th Session of the Indian Science Congress held at Delhi in January 1947.

Owing to postwar difficulties it was not possible to obtain the special apparatus required for the estimation of 17 ketosteroids in accordance with the method described by Callow, Callow, Emmens and Stroud (1939). It was decided therefore to attempt a separation of the androgenous and oestrogenous material in urinary extracts by a process of selective adsorption on a column of calcium hydroxide. During these experiments oestrone was obtained in sufficient quantity to allow of its identification.

Biological estimation of the oestrogen activity in the crude extract indicated that this was in excess of the normally accepted levels.

Experimental

Urine was collected daily and removed every morning to the laboratory for extraction. During the collection in the ward decomposition was prevented by storing the samples on ice. Though the mean temperature was high (90°F.) the pH of the samples remained very constant and did not rise above pH 6 before hydrolysis.

The daily collections measuring between 1 and 1½ litres were hydrolysed in accordance with the method described by Callow, Callow, Emmens and Stroud (1939). Extraction with benzene was effected by means of a mechanical shaker, as a continuous extraction apparatus was not available. This gave rise to a troublesome emulsion at times, which however could be broken down by stirring and removal of the benzene by filtration.

170 c.c. of benzene extract, equivalent to 1,400 c.c. of urine, were put through a column of dry calcium hydroxide 25 cm. \times 1.5 cm.

When this had passed through, the following coloured zones were visible in the column, reading from top to bottom: dark brown, light brown, yellow and pink.

The filtrate, measuring 100 c.c., yielded only a yellow gum on evaporation.

The column was then developed with benzene, and successive portions of the elute evaporated. Fraction I, amounting to 90 c.c., yielded more yellow gummy material which was discarded.

Fraction II was still slightly coloured, but on evaporation gave a white amorphous deposit, mixed with traces of yellow gum. This was dissolved in 1 c.c. of methyl alcohol and allowed to stand. Fine needle-shaped crystals were deposited, but the amount was not sufficient for further investigation.

Fraction III 90 c.c. was a clear solution and gave a white amorphous material on evaporation. This was dissolved in 5 c.c. of methyl alcohol and set aside to crystallize. After 24 hours fine needle-shaped crystals were obtained. These were filtered off, redissolved in methyl alcohol, re-crystallized, and dried. The yield amounted to 1 mg.

By this time the pink zone had reached the bottom of the column, and further elution gave highly coloured fractions, which on evaporation yielded only dark red amorphous deposits.

Minute red crystals were obtained from these fractions when dissolved in, and allowed to crystallize from methyl alcohol. These appeared to be pigmentary substances and were not further investigated.

The material obtained from fraction III gave positive sterol tests. It had a melting point of 247°C., which suggested its identity with oestrone.

Biological tests on ovariectomized mice were carried out in accordance with the 4-injection method of Emmens (1939), control animals receiving a similar series of injections of a solution made up from a standard specimen of oestrone. Examination of vaginal smears gave 100 per cent positive results in both series.

Oestrogenic activity of the phenolic fraction from the crude extract was also estimated by the same method. The results indicated an activity of 500 I.U. per litre of urine.

Discussion

Oestrone is excreted in small amounts in normal male urine, and output may be increased by the injection of testosterone, or androsterone (Steinach and Kun, 1937). Testosterone also can increase the output of androsterone. Part of the oestrone excretion may therefore be due to the degradation of these two substances in the body.

It is not the only source, as investigations indicate that both androgen and oestrogen excretion are contributed to by the adrenal cortex (Callow, Callow and Emmens, 1940).

Hyperfunction or tumours of the cortex may be accompanied by large quantities of oestrogen or androgen in the urine, and in such cases it is interesting that such hyperfunction or tumour usually produces excessive amounts of the hormone considered normal to the heterogeneous sex. Thus virilism in the female is usually accompanied by a large output of androgen, and feminism—a much rarer syndrome—tends to produce excessive oestrogen.

The reason for this is obscure. Vines *et al.* (American Medical Association, 1942) consider that the adrenal is a potentially bisexual accessory gland capable of excreting androgen and oestrogen under appropriate stimulation of the pituitary. Others consider that owing to the disturbed metabolic function of the cortex, androgen and oestrogen are produced as by-products, or intermediate products, during the formation of adrenal hormones.

While the influence of the pituitary on the adrenals is undoubted, it is difficult to understand why this should lead to excessive production of oestrogen in one case, of androgen in another, and sometimes to an undue amount of both in the same individual.

It may be that there are in reality two adrenocorticotrophins, and Golla and Reiss (1942) are of this opinion. The experimental work of Davidson and Moon (1936), and Davidson (1937) is also highly suggestive. These observers have obtained androgenic effects in

castrated rats following the injection of adrenocorticotrophin free from gonadotrophin or growth hormone. Moon (1937) has also observed signs of œstrus in immature spayed rats after similar injections.

Hypophysectomy in animals leads to degeneration of the zona reticularis and fasciculata of the adrenal cortex. Injections of pituitary extracts free from gonadotrophins will prevent these changes. It is in these zones that fuchsinophil material can be demonstrated in cases of virilism by the staining reaction introduced by Broster and Vines (1933). Feminism is a much rarer syndrome, but in a recent case reported by Simpson and Joll (1938), the staining reaction was negative.

Anselmino, Hoffmann and Herold (1934) have shown that following the injection of adrenocorticotrophin there is an increase in the number and size of the cells in the glomerular and fascicular zones, and also an increase in their secretory activity.

It seems therefore that two adrenotrophic hormones exist, and that their influence is exerted on different layers of the adrenal cortex. Under these stimuli androgenous material is elaborated in the inner zones and œstrogens in the outer. The output of excessive androgen or œstrogen in pituitary dysfunction, or in cortical tumour formation, originates in the particular zone which happens to be overactive, or is the main seat of tumour formation.

The results we have obtained during our investigations of the case mentioned in the opening paragraph strongly suggest hyperactivity of the zona glomerulosa in this patient, which in all probability was the cause of the excessive excretion of œstrone in the urine.

Summary

1. The isolation of œstrone from the urine of a case of feminism by a process of selective adsorption is described.

2. It is suggested that pituitary adrenocorticotrophin consists of two factors, and that each exerts its effect on different zones of the adrenal cortex.

3. Androgen and œstrogen are elaborated in different zones, and excessive production of either results from the particular zone which is overactive, or is the main seat of tumour formation.

Our thanks are due to Professor P. Chatterjee of the Medical College Hospitals for facilities afforded in our investigations on this case, and to the assistants of the department for their help.

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KALA-AZAR IN JAIPUR

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COMPARING the map of kala-azar distribution in the textbook of Napier (1943) with that given by Rogers and Megaw (1944), we find that the latter authors are showing some 'light incidence' reaching up to the south-east of Delhi, somewhere near Agra, while the former puts Lucknow as the westernmost point of kala-azar occurrence in Northern India. In 1937, however, 28 cases have been treated in the Punjab and 36 in Delhi (Annual Reports, 1939). Although this divergence points to some possible difference of opinion on the geographical distribution of kala-azar, all authors are agreed on 'its westerly extension being checked by the dry areas' (Napier, *loc. cit.*). Jaipur being well within these dry areas, the following report may be of some interest; it confirms the experience that wherever one looks for kala-azar, one shall find some.

Our way to the discovery of kala-azar among our patients was the experience that some cases of splenomegaly with more or less liver enlargement showed no response to antimalarial treatment, while Napier's aldehyde test, white blood picture, response to pentavalent antimony and the presence of Leishman-Donovan bodies in the sternal smear of two of them confirmed our provisional diagnosis of kala-azar.

The table shows the essential features of nine cases. We included those cases which showed a fully positive Napier's aldehyde test; doubtful reactions were discarded, so that we might have missed early cases of kala-azar, the aldehyde reaction taking about five months after the onset of clinical illness to become strongly positive. As neither trypanosomiasis nor schistosomiasis occur here, we seem justified in basing our diagnosis mainly on this test (*cf.* Napier, *loc. cit.*).

A considerable number of Leishman-Donovan bodies have been found in two (nos. 6 and 9) of our cases; they were scarce in one case (no. 8) so that the pathologist classified it as doubtful and not found in two cases, both of which had been under antimony treatment for some time prior to the sternal puncture.

Case no. 8, whose sternal marrow smear was described as doubtful as far as Leishman-Donovan bodies were concerned, presented such a classical picture of kala-azar (see table) that the diagnosis could hardly be doubted. With no other treatment but urea stibamine injections, his intermittent fever, which lasted for five months and in hospital reached 102°F. every day for 12 days, subsided completely after the third injection, i.e. after 0.325 gm. of urea stibamine; after 9 injections, making a total of 1.475 gm. urea stibamine, Napier's test was negative and after another 2.0 gm., two months after specific treatment was started, spleen and liver had regained normal size, leucopenia with lymphocytosis as well as anaemia were replaced by a normal blood picture, the sedimentation rate was reduced from 85/140 to 25/45. The patient, a tall man, was admitted with a body weight of 112 lb. and discharged with 131 lb.

In the two cases, whose sternal smear was negative for Leishman-Donovan bodies, the puncture was performed some time after specific treatment was started, because at this time we had no sternum puncture needle. One of them (no. 2) showed such a striking response to pentavalent antimony after everything else had failed that this alone, apart from all the other characteristic signs and symptoms, would establish the diagnosis beyond any possible doubt.

This young man was admitted with high remittent fever up to 105°F. which did not yield to the most intensive antimalarial therapy, including 5 intravenous quinine injections, and with profuse epistaxis which continued almost daily until hardly any hope seemed left to save his life; the second urea stibamine injection stopped fever and bleeding overnight. He regained health and a normal blood condition within four weeks.

Much time was lost in this case, even after the diagnosis was established, due to the impossibility of securing urea stibamine or stibatin locally, as no kala-azar ever was diagnosed in this part of the country, and the other antimony preparations, used here for the treatment of oriental sore, failed completely to give any relief. The other one (no. 1) whose sternal smear failed to show Leishman-Donovan bodies was complicated by a lymphocytic pleural effusion; Mantoux's tuberculin test was highly positive so that most probably a tuberculous pleurisy was present in addition. Here, again, every attempt failed to control his irregular high fever until urea stibamine injections were started.

All the other characteristic features of kala-azar, such as *splenomegaly*, *liver enlargement*, *leucopenia* with relative *lymphocytosis* (with the exception of no. 3 and, perhaps, no. 4), *hypochromic anaemia* and extremely *high sedimentation rate* of erythrocytes were present in all these cases. *Pigmentation* of a curious greenish-blackish tinge appeared in cases 1 and 9; no. 2 was fair, most of the others dark brown, showing no particular hue which could have led to the diagnosis.

Fever was recorded in five cases (nos. 1, 2, 6, 8 and 9) and two cases (nos. 4 and 5) were afebrile. One (no. 3) was afebrile but for two sudden rises of temperature up to 102°F. on consecutive days; malarial parasites were not found but the malaria flocculation test was ++ positive and the temperature subsided promptly with mepacrine. A further follow-up was not possible, the boy having been removed from hospital the moment he became afebrile. This case is peculiar for the co-existence of typical oriental sore, which promptly healed after 6 Pantorin injections, and a fully positive aldehyde test. It is well known that systemic kala-azar and oriental sore are very rarely found at the same place; the climatic conditions required by the respective transmitters being contrary to each other. *Phlebotomus argentipes*, the transmitter of the former, is an inhabitant of moist areas while *P. papatasi* and *P. sergenti*, which probably carry *Leishmania tropica*, the causal organism of cutaneous leishmaniasis, are found almost exclusively in dry climate with extreme temperatures such as the desert district of Jaipur State. But exceptions are known; kala-azar and oriental sore occur side by side in Crete and sporadic cases of both have been reported from Benares (cf. Napier, *loc. cit.*, p. 180).

The temperature of the febrile cases persisted, in spite of antimalarial treatment and every other therapeutic attempt to control it, including various antimony preparations, until urea stibamine was given; three to four doses of it brought down the high swinging temperature to normal; no relapse was seen if the patient took the full course and no toxic by-effects have been noticed.

Our intention mainly is to draw attention to the existence of kala-azar in this part of India which was supposed to be free from this infection and unlikely to be affected by it. Whether any of our cases could be considered as indigenous Jaipur infections has to be examined now (see table, col. 'residence'). No. 1 certainly acquired the infection in Calcutta, no. 2 most probably in Bihar and no. 8 in Gorakhpur district.

No. 9, positive for Leishman-Donovan bodies and the only female in our series, spent three years in Akbarpur, U.P., but, according to her history, remained healthy one full year after returning to Rajputana; the question is whether such a long incubation period is possible, whether

TABLE

Name Ser. No. Commun. Caste	Age Sex	Residence	Duration of fever	Date of examina- tions	Spleen*	Liver	Hb. %/ R.B.C. (millions)	LEUCOCYTE COUNT		E.S.R., 30 min./ 60 min.	Aldehyde test†	L.-D. in bodies in sternal smear	Treatment	Result	REMARKS
								Total	Poly/ lympho. %						
1. K. 1217/2936 Hindu Katal	18 M.	Calcutta for 4 months. Returned 3 months prior to admission.	1 month	26-2-46 9-4-46 26-4-46 10-6-46	+	+	26/1.8 42/3.2	5,600 .. 8,400	47/50 .. 78/22	120/150 22/36	.. ++ .. Doubtful	.. .. Neg. ..	Fantarin without effect. Urea stib- amine dramatic improve- ment. Urea stib- amine 1.3 gm. and carbostib- amide 0.8 gm. Fantarin	Improved	Pleural exudate; irregular high temp. M.F. neg.
2. J. 1381 Hindu Darogha	18 M.	Bihar for 2 years. Returned 1 year ago (Barwara).	2 years	5-3-46 2-4-46 2-5-46 16-7-46	+++ ++	+	32/3.2 58/4.9	2,400 .. 6,500	45/55 .. 64/36	135/158 14/28	.. ++ .. Neg.	.. .. Neg. ..	Cured	Cured	Severe epistaxis; fever of high tertian type. M.F. +++. Oriental sore upper lip. M.F. ++.
3. Gopi 1925 Hindu Mina- Zamindar	14 M.	Never left Jaipur State (Dausa).	2 years off and on.	28-3-46	++	++	38/2.5	10,200	60/40	25/52	++	Sternal puncture refused.		Sore cured.	2 malar. attacks. Bronch. asthma. Removed against medical advice. M.F. ++ afebrile while in hospital.
4. Bh. 2271 Hindu Gujjar	30 M.	Never left Jaipur State (Malpura).	2 years	7-4-46 5-5-46	+++ +++ +++	++	50/3.4 55/3.8	5,800 6,000	58/41 60/38	175/146 ..	++ ++	Not examined.	Anthiom- aline 10 c.c. Urea stib- amine then not available. Anthiom- aline 7 c.c. Carbostib- amide 0.06 gm. Carbostib- amide 0.06 gm. Urea stib- amine 0.04 gm.	Un- changed.	
5. G. 2360 Hindu Brahm.	16 M.	Never left Jaipur State (Chatsu).	Unknown	10-4-46	+++ +++ +++	+	42/2.5	4,000	50/49	105/138	++	Not examined.		Un- changed.	Afebrile while in hospital.
6. I. 2638 Hindu Balai	25 M.	Calcutta for 6 months. Returned 7 years ago (Dausa).	1½ years	22-4-46 7-5-46	+++ +++ +++	++	35/2.2 42/2.8	1,800 2,200	48/49 38/56	130/141 100/135	++ ++ ++	Positive		Some improve- ment.	M.F. ++ irregular temperature up to 100.8; left against medical advice.

	55 M.	34 M.	14 F.
7. Jh. 3207 Hindu Ahir	Nonad	Gorakhpur, U. P.	Akbarpur (U. P.) for 3 years. Returned 18 months ago (Narnaul).
8. B. M. 3414 Hindu Brahm.	13-5-46 20-5-46 23-5-46 16-7-46	3 years ago fever for 3 months 5 months	6 months
9. Sh. D. 5173 Hindu Agarwal	23-7-46 12-8-46 27-8-46 30-9-46 16-11-46 6-1-47	++ ++ Hardly palpable. ++ ++ ++ ++	++ ++ ++ ++ ++ ++
	36/2.4	42/3.2 .. 62/4.3	29/2.3 36 40/3.0 50/3.0 52/3.5 54/4.0
	4,000	3,200 .. 9,500	2,200 1,600 2,600 3,750 6,950 8,500
	48/52	54/46 .. 61/32 7% eosin.	46/54 62/38 45/52; eos. 3 63/28; eos. 9 68/28; eos. 4 78/14; eos. 8
	..	85/140 .. 25/45	50/110 50/97 .. 22/52 10/20 10/18
	++	++ .. Neg.	++ ++ ++ ++ Almost neg. Neg.
	Neg.	Doubtful ..	Positive
	None	Urea stib-amine 3.47 gm.	Urea stib-amine 2.3 gm.
	Un- changed.	Cured	Cured
	Afebrile while in hospital.	Admitted with remittent fever up to 103°F.; afebrile after 3rd urea stib-amine injection.	Admitted with intermittent fever up to 102°F.; afebrile after 4th urea stib-amine injection.

* Spleen reaches up to the umbilicus, +++++ up to the iliac crest.
† Aldehyde test +++++ : solid, white and completely opaque in 20 minutes.

++ : same appearance in 2 hours.
+ : same appearance in more than 2 and less than 12 hours.

the girl, though intelligent, did not notice the beginning of her illness, or whether she was infected in Narnaul, a district of Patiala State, bordering on Jaipur.

Interesting is also no. 6 who showed Leishman-Donovan bodies in the sternal marrow and definitely denied having left Jaipur State for the last 7 years when he returned from a 6 months' stay in Calcutta where he suffered from fever. The movements of no. 7 who belongs to a nomadic tribe could not be traced. Nos. 3, 4 and 5, however, maintained that they spent all their life in Jaipur State. Unfortunately, these three cases are the least convincing of this series. Neither a positive sternal smear nor a clear-cut therapeutic response to specific treatment, nor even a really characteristic blood picture help us in raising the diagnosis above doubt. It is based solely on a positive Napier's aldehyde reaction, facilities for carrying out complement fixation tests (Grevall, Sen Gupta and Napier, 1939) having not been at our disposal.

We are unable, therefore, to make a definite statement whether kala-azar of undoubted Jaipur origin exists, being not sure whether a fully positive aldehyde test, not corroborated by the presence of Leishman-Donovan bodies in sternal smears; is sufficient for establishing this diagnosis.

Summary

Nine cases of kala-azar are reported. It is discussed whether available evidence permits to extend the limits of the kala-azar area as far west as Jaipur State.

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THE ERYTHROCYTE SEDIMENTATION RATE IN RHEUMATIC FEVER AND OTHER CONDITIONS

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THE sedimentation rate of the red blood cells is considered by many to be a valuable aid in the prognosis of tuberculous affections, rheumatic infections and various other conditions although it has no value in the actual diagnosis of these conditions. Westergren (1921) considered the red cell sedimentation test to be of very great

value in prognosis, and Heaf, Grafe, Levinson and others have shown how the test is a gauge of cell destruction in lung disease.

The red blood corpuscles settle more rapidly in the blood of women than of men and very much more rapidly in pregnancy after the third or fourth month. Increased rate of sedimentation is seen in tuberculosis; in this disease it increases with the activity of the disease. In cancer the rate more or less closely parallels the degree of malignancy. In localized acute inflammations the rate appears to increase with the leucocyte count (Todd and Sandford, 1944).

The factors of prime importance in the rate of sedimentation of the red blood cells are the concentration of protein in the plasma and the number of the red cells (Fraser and Rennie, 1941). Fahracus (1925) showed that sedimentation of red blood cells occurred with great rapidity when there was an increase in the fibrinogen and globulin in the plasma and a fall in the albumin. It is well recognized that plasma fibrinogen and also globulin are increased by infectious processes and when tissue destruction is occurring, *i.e.* in just these conditions, in which the sedimentation rate is above normal (Fraser and Rennie, 1941). Increased rate of sedimentation of red blood cells occurs in anæmias. This is probably due, not to the red cells themselves, but due to the associated changes in the proteins in the plasma (Fraser and Rennie, 1941).

There are various methods of determining the erythrocyte sedimentation rate (E.S.R. for purposes of brevity). Westergren's method is both simple and for all practical purposes very useful. By this method, the normal rate for healthy men is 0 to 15 mm. in 1 hour and for healthy women 0 to 20 mm. in 1 hour (Todd and Sandford, 1944).

The normal limits (after 1 hour) according to textbooks are 3 to 5 mm. in the case of men and 4 to 7 mm. in the case of women, but in the experience of Napier and Das Gupta (1941) amongst Indians in Calcutta, the figures were 3 to 15 mm. in the case of men and 5 to 40 mm. in the case of women. Venkatrao (1940) states that in normal adult men in South India the E.S.R. ranges from 8 to 12 mm. and in women from 10 to 15 mm. but the rate is obtained by adding the reading of the first hour and half of the reading of the second hour and the result divided by two. The higher the figure the greater are the chances of active disease being present. There is no diagnostic significance about this test. When once a diagnosis is established and the test is repeated fortnightly, any increase in the rate means a rapid increase of the disease, increased cell destruction in the diseased lung for instance.

Similarly, in cases which are improving, the rate usually falls and returns to normal in arrested cases. Very often, impending pleural effusion or any exacerbation of disease can be foretold in these cases by the increase in the

sedimentation rate, days before the actual onset of the trouble.

This paper is based upon the observations of the author at the Government Stanley Hospital, Madras, and Stanley Medical College, Madras, from July 1940 to February 1945, on 47 normal healthy persons (36 men and 11 women) and 158 other cases. Out of the latter, 46 were cases of acute or sub-acute rheumatic fever, 16 of chronic rheumatic heart disease, and 96 of conditions such as myeloid leukaemia, fibroids, congenital heart disease, Banti's disease, tuberculous glands, etc.

Table I gives the E.S.R. in 36 normal males and 11 healthy females.

TABLE I

Case number	Age	Occupation	E.S.R., MM.	
			1 hour	2 hours
NORMAL MALES				
1	25	Medical student	4	5
2	25	House physician	5	6
3	23	House surgeon	4	7
4	20	Medical student	2	6
5	21	Do.	9	19
6	21	Do.	9	19
7	24	Do.	8.	19
10	23	Do.	5	12
13	20	Do.	5	6
14	24	Do.	2.5	8
15	24	Do.	2.5	8
16	22	Do.	5.5	12
17	24	Do.	2	6
18	25	House surgeon	2	6
19	23	Medical student	2	6
20	47	Laboratory attendant.	7	Not noted.
21	26	Medical student	1.5	6
22	20	Laboratory attendant.	10	28
23	24	Do.	5	12
24	24	Do.	10	25
27	22	Medical student	4	Not noted.
28	24	Do.	3	6
46	..	Nil	4	12
68	..	Nil	4	7
84	26	Medical student	6	12
85	30	Nil	2	4
94	13	Nil	3	6
95	20	Nil	1	1.5
97	24	Student	2	4
104	16	Do.	3	10
106	10	Do.	3	14
107	20	Nil	3	6
110	14	Student	3	15
126	..	Nil	7	30
130	10	Nil	10	25
151A	22	Laboratory attendant.	5	11

Total 36 cases.

Average for healthy males—

$$1 \text{ hour} = \frac{162}{36} = 4.5 \text{ mm.}$$

$$2 \text{ hours} = \frac{383.5}{34} = 11.3 \text{ mm.}$$

TABLE I—concl'd.

Case number	Age	Occupation	E.S.R., MM.	
			1 hour	2 hours
NORMAL FEMALES				
8	20	Medical student	5	9
9	22	Do.	11	24
11	21	Do.	16	38
12	26	Do.	18	40
25	23	Do.	4.5	13
26	21	Do.	7	15
66	..	Nil	10	45
67	35	Doctor	15	48
115	18	Nil	10	15
119	20	Student	14	36
96	24	Nil	14	28

Total 11 cases.

Average for healthy females—

$$1 \text{ hour} = \frac{124.5}{11} = 11.3 \text{ mm.}$$

$$2 \text{ hours} = \frac{301}{11} = 27.4 \text{ mm.}$$

Thus the average E.S.R. for males ranges between 1 and 10 mm. (1 hour) with an average of 4.5 mm. and between 5 and 30 mm. (2 hours) with an average of 11.3 mm. In the case of

61 mm. to 166 mm. at the time of admission into hospital. In some cases the E.S.R. was repeated at intervals till the time of discharge (table II).

Sixteen cases of chronic rheumatic heart disease were also studied. Out of these, 6 were females and 10 were males. The E.S.R. in the case of males ranged from 2 mm. to 35 mm. at the end of 1 hour and from 3 mm. to 70 mm. at the end of 2 hours. In the case of females, the figures were 3 mm. to 32 mm. at the end of 1 hour and 6 mm. to 67 mm. at the end of 2 hours.

TABLE III

Other conditions

Case	Sex	Age	E.S.R., MM.	
			1 hour	2 hours
Myeloid leukæmia ..	Male	37	20	40
Banti's disease ..	Female	23	22	47
Chronic kala-azar ..	Female	9	11	26
Aneurysm of ascending aorta ..	Male	..	45	48
Gargoylism of ascending aorta.	"	25	66	95
	Female	5	80	105

TABLE II

Rheumatic fever, acute and sub-acute

Case number	Sex	Name	Age	E.S.R., MM.	
				1 hour	2 hours
1	Female	Chinnakolandai	15 (9-8-40)	95	112
	Do.	Do.	15 (11-9-40)	60	96
7	Female	Thulukamma	25 (20-9-40)	138	157
	Do.	Do.	25 (4-10-40)	68	76
9	Male	Ananthanarayanan	24 (24-9-40)	144	Not noted
	Do.	Do.	24 (15-10-40)	72	106
14	Female	Fathima Bee	18 (2-12-40)	157	161
	Do.	Do.	18 (16-12-40)	128	145
22	Female	Shanmugavalli	13 (31-1-41)	115	140
	Do.	Do.	13 (18-2-41)	38	91
	Do.	Do.	13 (11-3-41)	19	48
	Do.	Do.	13 (25-3-41)	18	45
24	Female	Loganayaki	31 (31-1-41)	134	137
	Do.	Do.	31 (26-2-41)	66	110
	Do.	Do.	31 (11-3-41)	55	102
70	Male	Atmaram	17 (26-11-42)	55	Not noted
	Do.	Do.	17 (8-12-42)	4	12
153	Male	Khan Mohamed	45 (6-6-44)	100	120
	Do.	Do.	45 (13-6-44)	102	132
	Do.	Do.	45 (26-6-44)	110	144
	Do.	Do.	45 (14-7-44)	50	100

healthy females, the figures are between 4.5 mm. and 18 mm. (1 hour), average 11.3 mm., and 9 mm. and 45 mm. (2 hours), average 27.4 mm.

Of the 46 cases of acute and sub-acute rheumatic fever 19 were females and 27 males. The ages ranged from 6½ to 45 years. The E.S.R. at the end of 1 hour ranged from 37 mm. to 165 mm. and at the end of two hours from

The E.S.R. was also done in other conditions. The following interesting cases are mentioned :—

Case no. 1.—Chinnakolandai, Hindu, female, 15 years. Admitted on 30th July, 1940, for fever and painful joints. Diagnosis: Rheumatic fever. Cardiac signs also present.

E.S.R. on 9th August, 1940, was 95 mm. and 112 mm. (1 hour and 2 hours respectively).

Temperature reached normal on 22nd August, 1940, and remained so till her discharge from hospital on 17th September, 1940. Pulse rate had fallen to between 80 and 88 per minute from 22nd August, 1940, till date of discharge. E.S.R. on 11th September, 1940, however, was 60 and 96 mm. (1 hour and 2 hours respectively) though her temperature was normal. This suggests that the rheumatic infection had not completely subsided, though clinically the patient was all right.

Case no. 9.—Ananthanarayanan, Hindu, male, 24 years. Admitted on 21st September, 1940, for fever and painful swelling of joints. Cardiac signs such as presystolic murmur in mitral area, etc., were present. Temperature between 98° and 100.8°. Reached normal on 25th September, 1940. Pulse rate between 80 and 84 on and after 25th September, 1940. Diagnosis: Rheumatic fever.

E.S.R.

	1 hr.	2 hrs.
24-9-40 ..	144 mm.	..
15-10-40 ..	72 mm.	..

Remarks.—E.S.R. continues to be high, though temperature and pulse are normal.

Case no. 22.—Shanmugavalli, Hindu, female, 13 years. Admitted on 29th January, 1941. Diagnosis: Rheumatic fever.

E.S.R.

	1 hr.	2 hrs.
31-1-41 ..	115 mm.	140 mm.

Temperature and pulse rate normal from 1st February, 1941, onwards.

E.S.R.

	1 hr.	2 hrs.
18-2-41 ..	38 mm.	91 mm.
11-3-41 ..	19 mm.	48 mm.
25-3-41 ..	18 mm.	45 mm.

Remarks.—Though her temperature and pulse rate were normal from 1st February, 1941, her E.S.R. on 18th February, 1941, remained fairly high—38 mm. and 91 mm. (1 and 2 hours).

Case no. 24.—Loganayaki, Hindu, female, 31 years. Admitted on 25th January, 1941, for fever and pain over various joints. Had two similar attacks 10 years ago and two years ago. Diagnosis: Rheumatic fever. Temperature ranging between 100° and 105°.

E.S.R.

	1 hr.	2 hrs.
31-1-41 ..	134 mm.	137 mm.

Temperature reached normal on 1st February, 1941. Discharged against medical advice on 5th February, 1941. Re-admitted on 11th February, 1941, with fever and pain in joints.

E.S.R.

	1 hr.	2 hrs.
26-2-41 ..	66 mm.	110 mm.
11-3-41 ..	55 mm.	102 mm.

Remarks.—This patient went home against medical advice. She should have remained in hospital till her E.S.R. came down to within normal limits.

The above cases stress the importance of estimating the E.S.R. before the patient is discharged from hospital. When the temperature and pulse rate are normal, a high E.S.R. shows that the rheumatic process has not subsided completely, the cell destruction is going on and that the patient needs rest for some more time before he or she is permitted to resume work. In this respect, the blood sedimentation apparatus is as important as the clinical thermometer, stethoscope and blood pressure apparatus in the armamentarium of the practitioner. As the method is very simple, and can be performed at the bed-side, more frequent use of this procedure is recommended.

Summary and conclusions

1. The erythrocyte sedimentation rate has been determined in 47 normal persons, 36 males and 11 females, the majority of whom were medical students and members of the staff of the Stanley Medical College, Madras, and Government Stanley Hospital, Madras.

2. In the case of normal healthy males, the E.S.R. ranged from 1 to 10 mm. at the end of 1 hour with an average of 4.5 mm., and from 5 to 30 mm. at the end of 2 hours with an average of 11.3 mm.

3. In the case of healthy females, the E.S.R. ranged from 4.5 to 18 mm. at the end of 1 hour with an average of 11.3 mm., and from 9 mm. to 45 mm. at the end of 2 hours with an average of 27.4 mm.

4. The E.S.R. was also studied in 46 cases of acute and sub-acute rheumatic fever admitted into the Government Stanley Hospital, Madras, during the period July 1940 to February 1945, of whom 19 were females and 27 males. The rate was generally higher in the case of females and ranged from 37 mm. to 165 mm. at the end of 2 hours, depending upon the severity of the clinical symptoms.

5. In 16 cases of chronic rheumatic heart disease (6 females and 10 males), the E.S.R. in males ranged from 2 mm. to 35 mm. at the end of 1 hour, and from 3 mm. to 70 mm. at the end of 2 hours. In the case of females, the figures were 3 mm. to 32 mm. at the end of 1 hour, and 6 mm. to 67 mm. at the end of 2 hours.

6. The E.S.R. was studied in other conditions such as myeloid leukaemia, Banti's disease, chronic kala-azar, congenital heart disease, tuberculous glands of the neck, mediastinal tumour, etc.

7. Four cases of special interest are mentioned in which, though the temperature, pulse rate, etc., reached normal and the patient looked clinically all right, the E.S.R. remained high. A suggestion is made that in such cases, the patient

should be given rest in bed for some more time and fully investigated, until the E.S.R. reaches normal limits.

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A Mirror of Hospital Practice

SODIUM THIOSULPHATE AS AN ANTIDOTE IN PENICILLIN EXFOLIATIVE DERMATITIS

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THIS complication is not very common. The army records have reported only one case in a record of 10,000 cases treated with penicillin and that in a person who had suffered from syphilis. The interesting feature of the case reported below is that this patient too had some previous history of syphilis which was elicited rather late and that she was cured of her distressing condition by treating her with injections of sodium thiosulphate which is used in exfoliative dermatitis due to arsenic. We had failed with all other measures, and this was tried as the last resort with very dramatic results. In our experience we found a fair number of cases getting some sort of dermatitis and distressing itching after treatment with penicillin.

Patient, a Hindu woman, aged about 22 years, admitted on 24th January, 1946, for septicæmic pneumonia.

The patient gave birth to twins about a month prior to the date of admission. She was well for a week after delivery and then developed continuous fever with rigors now and then. This continued for a fortnight and she was brought to the closest dispensary. There she developed cough and pain in the right side of the chest. Fever continued. Having found no relief she was brought to this hospital for further treatment.

24th January, 1946.—On admission the patient was found to be suffering from septicæmic pneumonia in the right base. The general condition of the patient was rather acute and

critical. As penicillin was not available immediately, she was put on sulphapyridine tablets two 4-hourly for three days and then two t.d.s. for four days. Her general condition was slightly better but the temperature had not touched normal.

On 7th February, 1946, penicillin injections were started—20,000 units per dose—at 3-hourly intervals. She had 9 injections in all totalling 180,000 units. Cough, pain in the right side of the chest and fever persisted. Sedatives with iodine of potassium were given as also calcium by mouth.

On 20th February, 1946, the patient developed extensive urticarial rash and diarrhœa. Two days later she developed stomatitis and ulcerative glossitis. Calcium injections and vitamin B complex, particularly nicotinic acid tablets, were given but with no appreciable improvement.

On 4th March, 1946, she developed extensive exfoliative dermatitis all over the body, the skin peeling off in flakes. There was also oozing of serous fluid in certain parts. Diarrhœa, cough and fever continued and her condition became very critical. Cod-liver oil application, calcium and vitamin B₁ injections were tried but were of no avail.

7th March, 1946.—As sodium thiosulphate is effective in arsenical dermatitis and as all other measures of alleviating the condition had proved a failure, this drug was thought of and started immediately. Ametoxyl sodium (M. & B. sodium thiosulphate) injections were given intravenously every day for five days. The patient showed dramatic signs of improvement from the second day onwards. Oedema subsided, exfoliations got less extensive. Diarrhœa was controlled and the temperature became intermittent.

12th March, 1946 to 16th April, 1946.—From 15th March, 1946, the temperature struck normal and remained there, showing a rapid progress. There was less cough and the skin became normal. Stomatitis and ulcerative glossitis disappeared

Appetite improved. The patient was put on 'Vitrated' Upjohn's and more liberal diet. By 16th April, 1946, she was able to walk about and was discharged cured.

A CASE OF RICHTER'S HERNIA STRANGULATED IN THE FIRST DESCENT IN A CONGENITAL RIGHT INGUINAL HERNIAL SAC

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S. C. S., a Hindu male, aged 25 years, cultivator, was brought to the Campbell Hospital on 23rd January, 1947, at 5 p.m., with severe (colicky?) pains all over the abdomen.

On 20th January, 1947, at about 12 midnight, the patient passed a stool. The stool was a constipated one and was followed in a few minutes by pain of colicky type around the umbilicus. The pain increased and ultimately spread all over the abdomen. At the same time he noticed a cord-like swelling near the right groin. He started vomiting a few hours later and vomited several times. Next morning he noticed that his scrotum was swollen on the right side. Since the onset of pain, the patient passed no flatus or faeces. Gradually the abdomen got distended and the swelling in the scrotum increased. He did not vomit during the few hours he was in the hospital before operation. Patient took fluid feeds throughout.

On examination.—Patient did not look very toxic or badly dehydrated. Tongue was slightly moist, pulse 100 per minute, BP 120/90, and temperature 98.4°F. Abdomen was moderately distended with prominent coils of intestine showing visible peristalsis. Liver dullness was present. Shifting dullness was not present. Auscultation proved increased peristalsis. In the region of internal abdominal ring and lateral half of the inguinal canal, slight fullness and a small tense swelling (1 inch \times $\frac{1}{2}$ inch) were felt. The spermatic cord below the swelling was felt to be thicker than that on the left side. The right side of the scrotum was distended with opaque fluid under low tension, the testis was found to be of normal size and not painful though the patient gave history of an old orchitis on the same side.

An enema was given with no result. Patient could not be sure whether he passed flatus or not.

A provisional diagnosis of intestinal obstruction due to a small bit of intestine being pinched in internal abdominal ring was made but the findings of the inguinal region were more like those of funiculitis.

Operation.—The right inguinal canal was opened under open ether anaesthesia. On opening the sac a small bit of intestine was found lightly congested on the lateral side and blood-stained fluid welled up from the scrotal side of

the sac. The intestine was relieved from the constricting band just below the neck of the sac. In order to examine the proximal portions of the intestine, about 3 inches of the loop were pulled out with difficulty. Obviously the mesentery was short and the portion of the gut that was strangulated was found to belong to the lowest part of the ileum. About three-fourths of the circumference was incarcerated. On exploring the sac on the scrotal side, it was found to be continuous with the tunica vaginalis which contained about 4 oz. of blood-stained fluid. The intestinal wall regained peristaltic movements after warm applications and was replaced into the abdominal cavity. The upper portion of the sac was excised at the neck and the lower half was everted on the testis as is done in hydrocele operations. The wall of the inguinal canal was not repaired. Patient made an uneventful recovery.

Discussion.—In 1778 Richter described a small rupture in which only a portion of the gut wall was incarcerated and recognized this as a distinct type of strangulation in a hernia. There were 94 references in literature when Fowler's paper describing two cases was published in 1899. Between 1899 and 1928 there are references to 45 cases. And after 1928 there are 15 references more. Most of these references described Richter's hernia occurring in the femoral canal. Very few cases are recorded in the inguinal canal. Muntabhorn of Guildford mentioned 3 cases in Guy's Hospital reports, 1944, of which one was femoral, one obturator and one inguinal. He said that though the symptoms were like those of ordinary strangulation, the distension was not marked and constipation might not be absolute. A few cases in the inguinal region did show absolute constipation. The interesting and important points in my case are:—

(a) The patient was a manual labourer of 25 years of age, with a congenital hernial sac.

(b) He developed a strangulated hernia of Richter's type in the first descent due to straining, at stool, and a secondary hydrocele from the collection of fluid from the congested gut wall.

(c) Though he had intestinal obstruction for 65 hours, he did not look very ill nor had he marked distension. The absolute constipation may be supposed to be due to the kink in the intestinal loop. The reason for his getting a Richter's hernia might be the shortness of the mesentery and the strong inguinal sphincter present.

A strong inguinal sphincter is really the important barrier in preventing a hernial protrusion.

I thank Major E. H. Lossing, Superintendent, Campbell Medical School and Hospital, and Dr. S. K. Chatterjee, Honorary Surgeon, Campbell Hospital, for their permission to publish this case, and Drs. S. Banerjee and S. Ray for their assistance.

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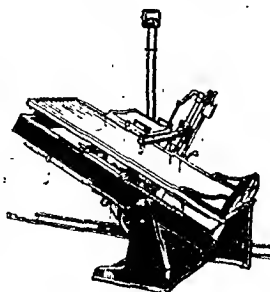
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Indian Medical Gazette

JUNE

PRIMARY ATYPICAL PNEUMONIA

THE failure of sulpha drugs to cure cases of pneumonia, sporadic or in certain outbreaks, brought to light two facts: (1) Certain cases do not conform bacteriologically to the accepted picture of pneumococcal pneumonia, even when other known causes are excluded. (2) Certain cases do not conform clinically to the accepted picture of either lobar pneumonia or broncho-pneumonia. X-rays may show a mild, moderate or marked infiltration in one or several lobes of the lungs. The temperature may be slight or as high as 105°F. The disease may run its course in a few days or may last several weeks. These and similar points have been discussed in this journal previously (Editorial, 1944).

Later, the failure of penicillin and streptomycin focused more attention on the subject and brought to light four other facts: (1) It is now believed that in America the disease is much more prevalent than lobar pneumonia in the adult population, civil or military (Hyman, 1947). Mild cases do not attract attention and are accepted as cases of bad cold on the chest. (2) The disease is associated with the development or increase of the cold iso(haemagglutinin)s in the blood of the patient. These isonins agglutinate the red blood corpuscles of the same group, of the subject's own blood—autohaemagglutination—or of a subject belonging to group O, at a low temperature—about 4°C. (3) The disease is caused by a virus, probably allied to that of psittacosis, and has been recently transmitted to human volunteers inoculated intranasally with pooled sputum, nasal washings and bacteria-free filtrates. (4) The patient's serum gives a false-positive Wassermann reaction.

The detection of the cold isonins has been used as a means of diagnosis (Turner, Nisewitz, Jackson and Berney, 1943; Shane and Passmore, 1943; Dyke, 1947; Hyman, *loc. cit.*). The technique is simple. The serum is diluted serially, 1 in 4, 1 in 8, 1 in 16. . . . The dilutions are mixed with equal volumes of a 1 per cent suspension of the test corpuscles and the mixture left overnight in a refrigerator (about 4°C.). Next day the deposit in the tubes is examined quickly while the tubes are still cold. The examination is best done by holding the tube on the sub-stage concave mirror of a microscope (lying on its side). The edge of the deposit of the red blood corpuscles which have simply been deposited by sedimentation is smooth and puts out a tongue on tilting the tube. The edge of the deposit of the red blood corpuscles which

have been agglutinated is crinkly, granular, rough or firm and does not put out a tongue on tilting the tube. The haemagglutination is abolished by leaving the tubes in a water bath at 37°C. or in an incubator at the same temperature. A macroscopic examination is enough. A titre of 1 in 32 is considered diagnostic. The titre is indicated by the *initial* dilution of the serum, not the *ultimate* dilution. (Hyman considers a titre of 1 in 50 diagnostic, with a slightly different technique.) Occasionally the titre reaches the high level of 1 in 20,000. The reaction, however, is not specific and is known to occur in malaria, mumps, orchitis and haemolytic anaemia (Hyman, *loc. cit.*).

The false-positive Wassermann reaction is an annoying discovery and adds one more condition to the long list of non-specific conditions responsible for a positive Wassermann reaction (Greval, 1943, 1946). A positive Wassermann in a febrile case showing chest symptoms calls for a concurrent test of the isonin content of the serum. Further, the high incidence of syphilis in America, as judged by the positive Wassermann rate, presumably needs a re-assessment, in view of the incidence of the atypical pneumonia in that country. Is it really 10 per cent? Do 'ten million Americans have it' really (Becker, 1937)?

Although the atypical pneumonia is not a serious disease the complications, probably caused by secondary infections, may be serious. They are bronchiectasis, necrotizing pneumonia, pulmonary abscess, pleural effusion, pneumothorax or empyema. The sulpha drugs and penicillin are, therefore, useful not only in therapeutic tests but also, later in prophylaxis against the secondary infections. They should be used as long as the high temperature persists. Otherwise symptomatic treatment suffices. The nourishment should be maintained.

Is the atypical pneumonia a newly born disease? Probably it is or has come round again in a cycle after a long absence. Otherwise the clinicians would not have been so emphatic in banning the diagnosis of primary broncho-pneumonia in the adult about thirty years ago. The disease clinically is suggestive more of broncho-pneumonia than of lobar pneumonia and is definitely primary. It could not have been missed if it had existed at the beginning of the century.

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THE TWIN DOMINIONS AND THE INDIAN MEDICAL GAZETTE

By the time these lines appear in print the Indian Empire will have passed away handing over its assets and liabilities to the twin dominions of India and Pakistan. The *Indian Medical Gazette*, however, will keep its service unimpaired and its attention undivided for both the components of the old country which it has served for the last 81 years.

The first number of this publication appeared in 1860, eighty years after Victoria the Great, the Queen of England, had taken into her own hands the reins of the Government of India as the Empress of India, after terminating the merchant rule of the East India Company.

The journal is the oldest medical monthly of the Eastern hemisphere and will, of course, devote itself to medical problems, anxieties, interests and progress in India and in Pakistan alike. Medicine includes Public Health.

The journal has been run for the major part of its life by the officers of the I.M.S. That service too will have passed away. The journal, however, will carry on. From the ashes of the old phoenix will arise the young phoenix capable of lustier songs embodying Asian themes and more acceptable to the Asian ear.

The journal has a policy but no particular platform. Any structure with sound planks will do. From it will be delivered messages of health, happiness and strength: items which fall well within the province of medical men and enable a nation to unfold and develop all its potentialities, material and spiritual, and to win its neighbours' respect and gratitude.

Due to the prolonged disturbed conditions in Calcutta this number of the *Indian Medical Gazette* although dated June is appearing after 15th August, 1947, the date of the transfer of power to the twin dominions of India.

A SPECIALLY ESTEEMED CONTRIBUTOR

SUCH is Sir Leonard Rogers, K.C.S.I., M.D., F.R.C.P., F.R.S., I.M.S. (retd.), who has favoured us with an article entitled 'The Present Position of Antimony Treatment of Filariasis' on this page.

Sir Leonard retired under the age rule in 1920 to work in a wider sphere. This great loss to India, therefore, was a gain to every medical research worker all over the world.

Sir Leonard speaks on many subjects with such authority as is derived from a life-long study of facts, events and the inter-related causes and effects.

The younger readers in India who possibly limit their study of current literature to this journal only may not have read many articles by Sir Leonard before. The last article entitled 'Tetanus Neonatorum in the Tropics: A Suggestion for its Reduction' was published in these pages in July 1944, page 297.

Special Articles

THE PRESENT POSITION OF ANTIMONY TREATMENT OF FILARIASIS: WITH A SUGGESTION FOR ITS INTENSIVE USE

By SIR LEONARD ROGERS, K.C.S.I., M.D., F.R.C.P., F.R.S., I.M.S. (Retd.)

AMERICAN workers at Porto Rico have recently confirmed my investigations of 1919-20, which demonstrated that large intravenous doses of the trivalent sodium antimonyl tartrate have a lethal action on *Filaria (Wuchereria) bancrofti*. They have also made an important practical advance by extending this observation to the less toxic pentavalent antimony salts, which were not available at the time of my work on the subject. A brief review of present position of the subject will therefore be timely.

The discovery by J. B. Christopherson in the Sudan of the curative action of tartar emetic against infections with schistosome worms led me to try antimony salts in filariasis. In April 1919, I carried out preliminary trials at Puri with

the kind help of the civil surgeon, Dr. P. N. Das. Counts of the microfilaria in 20 cm. of evening blood were made daily before and after treatment with daily doses of a 2 per cent solution of sodium antimonyl tartrate, which I had found by animal experiments to be slightly less toxic than the potassium salt, tartar emetic. A preliminary note showed that 7 to 11 daily 5 c.c. doses in four cases, showing up to 100 microfilaria in 20 cm. blood before treatment, greatly decreased the number in all, and in one 11 doses reduced the number within 15 days to only 6 per cent of the former number.

This partial success led me to work at the Cuttack jail to allow cases to be kept under regular observation for much longer periods than proved to be possible at the Puri hospital. Microfilaria counts were made in 100 apparently healthy long-term prisoners, and 8 with an average count of 73 microfilaria per 20 cm. 9 p.m. blood were selected for treatment with daily doses of the sodium salt rapidly pushed up to 5 c.c. of a 2 per cent solution intravenously.

The immediate effect was striking, for at the end of six days the average number of embryos had fallen to only 10 per cent of the original number in the eight cases. Toxic symptoms led to the 5 c.c. doses being given only every other day up to 45th day, with an average total of 1.8 grammes of the sodium salt. Counts were made every day for 18 days, and then every three to seven days up to five and a half months; that is up to four months after cessation of treatment. Counts were also made in five control cases and the microfilaria were found to vary between 45 and 160 per cent of the original numbers. Immediately on reducing the frequency of the doses the average count rose to 45 per cent. Subsequently the cases resolved themselves into two groups of four each, the variations in the number of microfilaria in each of which is shown in a chart in my paper of 1920. The average counts of the four cases which relapsed are shown in the upper curve of continued lines with sharp peaks up to about the original numbers, which recurred every month after treatment was stopped, as did more frequent similar peaks in the control cases. On the other hand, the average numbers in the other four cases, shown by a broken line, fell steadily during the last three months without treatment to reach only 3 to 9 per cent of the original number. In these the antimony had a lasting effect.

However, the most important observation I made, as a result of frequent microfilaria counts in the evening blood over nearly six months, was that the regularly recurring peak rises in the control and in the relapsed cases were due to sudden appearance in the peripheral blood of very large numbers of thin young embryos, easily distinguished from older forms. This interesting finding was confirmed in 1922 by Roy and Bose at Puri, who also noted that these thin forms showed less developed cells than do the older forms. This confirms my view that these sudden increases are due to the birth of large numbers of young embryos at regular intervals in individual cases, just as Waring in 1882 showed that the intervals between attacks of filarial febrile lymphangitis remains the same over long periods in individual cases, although their frequency varies in different cases. My further observation that such young forms did not appear in the blood during the three months of steady decline in the numbers of microfilaria after cessation of treatment in the four recovering cases, led me to conclude that the adult worms had either been killed or very seriously damaged in these cases by the antimony treatment.

Explanation of the periodicity of filarial febrile lymphangitis.—Long ago Patrick Manson suggested the ingenious hypothesis that filarial lymphangitis is caused by the adult filaria periodically giving birth to unhatched ova instead of thinner free embryos. As early as 1904, I attempted to verify this hypothesis by search-

ing for ova in centrifuged material from a number of recently removed scrotal elephantoid tumours, but with completely negative results. The above observation would appear to explain satisfactorily the periodical attacks of lymphangitis by the sudden birth of such large numbers of young embryos causing additional lymphostasis in areas where lymphatic obstruction prevents their entry into the peripheral blood. Successful antimony treatment should in this case reduce the frequency of attacks of filarial fever and thus check the progress of elephantiasis. The following confirmation of my work shows that this is the case with patients who can stand the necessary large doses of toxic trivalent antimony salts.

Confirmation of the value of antimony in filariasis.—Firstly, a number of cases recorded by P. N. Das in 1920, Day in Egypt in 1921 and by Roy and Bose, working at Puri, in 1922, demonstrated that the large total dosage of sodium antimonyl tartrate I employed is effective in completely eliminating originally large numbers of microfilaria from the peripheral blood presumably due to the adult worms being killed. Secondly, cases were soon reported by myself and by P. N. Das in 1920, by Roy and Bose in 1922 and by Bär in the Dutch East Indies, in which periodical attacks of febrile lymphangitis were stopped, in the majority for long periods, by the same treatment. Thirdly, in 1922 Roy and Bose reported on treatment of fifty cases of elephantiasis of limbs, with careful measurements before and after. They obtained improvement in every case, commencing after five injections of 2 to 5 c.c. of 2 per cent solution of the sodium antimonyl tartrate, and reaching a maximum in some cases of two inches' diminution in the circumference of the limb. On the other hand in 1924 the British Guiana Filariasis Commission under Liper reported that tartar emetic was the best of many drugs they tested, but was of limited value. The toxicity of the full doses required has much limited the use of trivalent antimony salts in filariasis.

Trials of less toxic pentavalent antimony salts.—My Calcutta investigation was cut short by my leaving India early in 1920, preparatory to retirement under the age rules, before the less toxic pentavalent antimony salts, which proved much more effective than the trivalent ones in kala-azar, had become available. However, in 1929 R. N. Chopra and S. Sunder Rao reported on trials of a number of such antimony preparations at the Calcutta School of Tropical Medicine. Unfortunately the duration of the treatment, the total dosage used and the follow-up period were all insufficient to furnish anything but negative results. For example, only two cases were treated for 8 to 18 days with 0.1 to 0.3 gm.

Recent American Researches.—In 1945, Professor Culbertson of New York showed that the adult stage of a filarial worm, which inhabits

the pleural cavities of cotton rats, can readily be killed by antimony treatment; but that many months elapsed before its microfilarial stage completely disappears from the peripheral blood. With the help of six colleagues three years' investigation of the action of various antimony preparations on infections with *Filaria baneroffi* were carried out at the Porto Rico Medical School, and summarized in a recent paper read before the Royal Society of Tropical Medicine and Hygiene in London. The trivalent tartar emetic was used in four cases with an average total dosage of only 0.79 gm. in the course of 14 days: one-half the dosage spread over one-third of the time of those in my cases. Nevertheless, the number of microfilaria were ultimately reduced from 41 to 6 per cent of the original numbers. The best results were obtained in three series of cases treated with the pentavalent neostibosan, which was the least toxic. In the first series of twenty cases a total dosage of from 5.8 to 10.5 gm. was given in the course of 9 to 54 days and blood counts, recorded at six-monthly intervals up to two years, showed complete disappearance of the embryos from the blood at the end of from 25 days to 24 months in 16. Except in the case receiving only 9 gm., large decreases occurred in three more. In a second series two courses of the drug were given with an average total of 10.4 gm., with elimination of the embryo form from the blood after 5 to 14 months from the completion of the treatment in seven cases and great reduction in the other three. In a third series of five cases one intensive course of 9.5 to 15.5 gm., and an average of 11.8 gm., proved completely effective in three cases after one-half to 9 months, and produced great diminution of the microfilariae in the other two at the end of 16 months. Neostibosan is therefore the drug of choice in the treatment of filariasis, wherever the cost of such large doses of an expensive drug does not limit its use in view of the immense number of cases requiring treatment in such hyperendemic areas as Orissa.

Intensive tartar emetic treatment of helminthic diseases.—In this connection it is worthy of note that Alves and Blair (1946) have recently reported that 100 cases of schistosomiasis have been cleared of ova in the urine by the following two-day intensive course of tartar emetic. They injected intravenously on each of two successive days 1 to 2 grain doses in 10 c.c. of 5 per cent glucose, at a very slow rate by taking five minutes over each injection, three daily at three-hourly intervals. The total dosage was 7 to 14 grains, or about one grain for each 12 lb. body weight.

In view of the reduction in my eight cases of the microfilaria to only 10 per cent of the original numbers after only six daily large doses of sodium antimonyl tartrate, an intensive course of this drug appears to be worthy of a new trial in filariasis. As longer treatment with larger

total dosage will be required than in schistosomiasis, I would advise only two daily doses, one in the morning and the other in the evening. The patients should be in hospital and toxic symptoms watched for. Slight nausea is sure to occur, but actual sickness should be regarded as an indication for temporary cessation of the injections for a day or two. To make counts of microfilaria before and after treatment the measured amount of evening blood should be allowed to dry in thick films to ensure the film adhering firmly to the slide. Then place overnight in a very dilute solution of methylene blue in a basin or other suitable vessel to dissolve out the hæmoglobin and stain the microfilaria. The number in each slide can then be counted quickly with a low magnification and a movable stage.

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SMALL, FAINT AND HIDDEN BLOODSTAINS

By S. D. S. GREVAL

LIEUTENANT-COLONEL, I.M.S.

(From the Imperial Serologist's Laboratory, School of Tropical Medicine, Calcutta)

NEED FOR CRITICAL VISUAL INSPECTION

This group needs a critical visual inspection and is composed of (I) stains caused by sprays and splashes, (II) smears, (III) traces left after wiping or washing, (IV) specks from the activity or squashing of vermin, and (V) hidden collections under nails of fingers and toes and in crevices and joints of weapons. All of them are represented in 14,200 (in 1940-41) to 18,500 (in 1939-40) stains tested annually from all over India for medicolegal purposes in this laboratory.

I. SPRAYS AND SPLASHES

Droplets from sprays and splashes falling on an object obliquely are in shape like old-fashioned soda-water bottles (with spheroidal bottoms, not made to stand), the first impact producing the bottom and the movement the neck. Only when they fall at right angles to the surface are they round. While several such round spots, in a pattern, will indicate a splash a single spot will fail to supply a clue: a

blood-sucking insect during a feed (*vide infra*) can deposit a similar spot.

II. SMEARS

The deposit of blood in a smear is superficial. While chemical and spectroscopical tests, proving the presence of blood, may be undoubted the serological tests, proving the presence of human blood, may be weak and the stain is, therefore, reported 'disintegrated'.

In reporting on human blood the term 'disintegrated' denotes, conveniently, all failures to find human blood after blood has been found, including weak reactions which in experimental work may be accepted as positive but must be rejected for medicolegal purposes. The same remarks apply to the determination of the source of animal blood.

Incidentally, the stability of the reaction of the shed blood in India is not of the same high order as that described by workers in colder climates. The serum protein (i) turns insoluble, as a result of exposure to heat (and possibly light) and (ii) decomposes, as a result of putrefaction, much more frequently than in Europe.

III. TRACES LEFT ON FABRIC AFTER WIPING A WEAPON ON IT OR AFTER WASHING IT

Streaks are likely to be seen with a hand lens in such stains. One important feature of a washed stain is that the edge may be stiffer than the centre and give a better serological reaction. This is due to the accumulation of serum along the edge when a clot has formed and contracted on the fabric prior to washing which aims at removing the clot only. The chemical and spectroscopic tests may be strong in the centre, if a minute fragment of the clot has been left, and weak or absent along the edge. A specimen, however, must be positive spectroscopically before it is tested serologically. This condition must be rigidly adhered to until the chemical luminescence test for blood (McGrath, 1942; Naidu and Pitchandi, 1943) has been tried extensively and found to be superior to the spectroscopic test. Spectroscopically negative and serologically positive stains are occasionally found among washed stains: the report on them is 'No blood found'.

IV. SPOTS FROM THE ACTIVITY OR SQUASHING OF VERMIN

Insects are known to pass droplets of unaltered blood from the anus just after commencing a feed. The droplets so passed and deposited are small but recognizable as such by the unaided eye.

The stains resulting from the squashing of engorged vermin (including insects, ticks and even leeches) are sharply angular in outline. Recognizable bits of the vermin may be present (scales and bits of eyes from mosquitoes; eggs, bristles and cuticle from bed bugs; tracheæ

from both; for instance). The body pulp of the vermin does not soak into the fabric like blood. Even in the absence of the body pulp and bits it is quite easy to say whether a droplet of blood has dropped on the fabric as a free globule or has been squirted out of another small object under pressure (angular outline), with reasonable certainty.

Mosquitoes and bed bugs may suck blood from a person of one blood group and on being squashed on articles of another person of another blood group may create a false evidence against the latter of being in possession of someone else's blood. The writer has fed newly hatched mosquitoes and bed bugs on blood of group O, A, B and AB and demonstrated the groups in stains produced by squashing the insects on chemically pure filter paper (Greval, Bhattacharji and Das, 1944). The mosquitoes were squashed 3 hours and 24 hours after the feed. The bed bugs (which were fed for several days) were squashed 3 hours after the last meal (24 hours' experiment was not undertaken). A fully engorged mosquito and bed bug can provide enough material for an absorption test.

Professional keepers of leeches empty them, after application and engorgement, by pricking near the posterior extremity and then milking. The blood of a certain group may drop accidentally and even be squirted intentionally on articles of a person of another group and again create a false evidence. Outlines of such drops are not angular.

Even lice crushed between thumb nails (the usual method of destruction) may leave the blood of a different group under the nails of a subject. The nails will certainly be found to be stained with human blood.

V. HIDDEN COLLECTIONS UNDER NAILS OF FINGERS AND TOES AND IN CREVICES AND JOINTS OF WEAPONS

When blood is found on the nails of fingers and toes certain exclusions become necessary. (i) In the case of the fingers the person (a) must not be suffering from skin conditions inducing scratching and drawing blood and (b) must not have killed lice (*vide supra*). (ii) In the case of both fingers and toes the nails should be cut with care and local bleeding avoided. The Indian barber is also a manicurist and chiropodist. He does not cut nails with clippers but pares them with a special instrument in one movement. He is quite likely to cut the nail-bed and cause capillary bleeding at times, especially in his zeal to remove as much of the nail as possible.

For excluding the possibility of traces of blood the suspected weapons are usually dis-jointed and the newly exposed surfaces tested. It is possible to remove enough material for examination by washing out the joint with normal saline contained in a teat pipette. A

previous soaking (wrapping in chemically pure filter paper soaked in normal saline and leaving in an ice chest overnight) may be necessary. This process should be tried, at least in the case of expensive and artistically valuable weapons, before destruction is resorted to. The same remarks apply to expensive clothing and important documents (including those carrying signature in blood; at least one such exhibit has been tested during the last thirteen years). A method for expensive fabrics has been described previously in connection with determination of blood groups from stains (Greval, Bhattacharji and Das, 1943).

AN OPINION OF THE SIZE, QUALITY AND CAUSATION OF THE STAINS

The value of such an opinion is obvious. A smear of blood where a pool is expected, small spots which though positive for human blood may be caused by insects, traces of blood under the finger nails of a sufferer from bad itch, a splash on a protected part of a garment or from a direction not consistent with the rest of the evidence, are all significant and in favour of the defence.

An error emerging from the following sequence of events is possible: (1) A Chemical Examiner receives a garment bearing many stains suspected to be bloodstains by the police and specially marked for examination. (2) He cuts out small fragments from all marked areas, examines them and finds them negative for blood. (3) He also notices an unmarked minute spot (possibly of insect origin) and finds it positive for blood. (4) He forwards only the minute positive spot to the Imperial Serologist who finds the blood to be human. (5) The positive report of the Imperial Serologist and the garment with many stains and holes in it are placed before the Court. (6) The Court forms an opinion that all areas examined (corresponding to the holes) are stains of human blood (from a personal communication from Rai Bahadur K. N. Bagchi, Chemical Examiner, Bengal, 1943). As is well known, Chemical Examiners (and the Imperial Serologist who is also a Chemical Examiner) are exempt from appearing in Courts under Section 510 of the Criminal Procedure Code. Their written report, therefore, should be more descriptive.

Faint stains are bound to be 'disintegrated' mostly. Their proportion varies from province to province in India depending upon the methods employed in investigation [Annual Reports of the Department of Imperial Serologist and Chemical Examiner to the Government of India; last published report (Greval, 1940)].

These remarks apply to stains collected for determining the source of animal blood also.

SUMMARY

1. Small, faint and hidden stains are discussed. Even though positive for human blood

they may not be associated with criminal violence.

2. The value of a relevant description of a stain, including causation, is pointed out.

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Medical News

FUTURE OF COTTAGE HOSPITALS

By A. W. HASLETT

(Abstracted from Release No. F425, dated 14-3-47 offered by the United Kingdom Publicity Services, New Delhi.)

THE name 'cottage hospital' calls up a picture of roses and old England which bears little relation either to its past history or present appearance. Tradition indeed suggests that the name may have originated in the presumed custom, in some villages, of setting aside a cottage which could be used by doctors in their work. A more prosaic, but more probable, explanation is to be found in the fact that the word 'cottage' was once used to cover 'a small country residence', as well as the traditional village cottage with its roses round the door, and character-lined occupants which were at one time so popular with film producers.

The first cottage hospital was instituted in 1859 at Cranleigh, a Surrey village, by Alfred Napper, Fellow of Britain's Royal College of Surgeons. The house which he converted for the purpose was rather a small country house than a cottage in the ordinary sense. Before that date, all cases of accident and illness in villages and country districts had to be treated either at the county hospital—if they could survive a coach journey of perhaps two or three hours on indifferent roads—or else in their own homes.

For the first five years, progress was slow. Cottage hospitals were opened, on the average, at the rate of two a year. But in 1866 no fewer than 14 cottage hospitals came into being, and by 1870 the annual increase had reached 17. By that time, antiseptic surgery was beginning to win recognition, and by 1880 the need for aseptic conditions had provided an overwhelming case for operation under conditions of assured cleanliness in hospitals.

The first cottage hospitals were essentially places for the treatment of the sick poor. Of the first 100 patients at the Cranleigh Hospital, 67 were parish paupers, 7 more were incapable of paying the surgeon, 16 were 'in humble circumstances', and for the remaining 10 cases fees were paid by the poor law guardians.

As time went on, the status of cottage hospitals was steadily raised. Whereas, at the time of their first foundation the rich were treated at home, they soon realized the advantages of hospital treatment and the local cottage hospitals began to be used by all classes in country districts, for emergencies and minor operations.

To-day, the main characteristic of a cottage hospital is that it is a hospital staffed by local doctors, none of whom normally would claim to be surgical specialists, although a number in any area have more

or less regular experience of surgery within limited fields. The dictionary definition is that it is a hospital with no resident doctor. Hospital statistics are on the basis of size. In England, outside of London, there are some 120 hospitals with less than 30 beds, most of which would be classed as 'cottage hospitals', and there are another 14 in Scotland.

As to the fate of these 120 smaller hospitals under the unified hospitals service, which will be introduced under the National Health Service Act, it is too early as yet to make detailed forecasts.

Under any organization, however, it is a safe assumption that the majority will continue to serve a useful purpose. There is a clear advantage to the patient in remaining within easy reach of his friends. Besides, most of these hospitals have been paid for out of local subscriptions and there would be natural opposition to their disappearance.

There is also a genuine need for accommodation in which general practitioners can treat those of their patients who are not ill enough to need the services of a major hospital, but who cannot be satisfactorily looked after in their own homes.

The greatest difficulty which may be experienced, under State responsibility, is in defining the limits to which general practitioner surgery should be allowed to go—if, indeed, there should be general practitioner surgery at all. In favour of the country surgeon—who is seldom wholly a surgeon, but rather does the surgical work of his district—it may be argued that he is perfectly competent to remove the tonsils and adenoids of his child patients, and that the occasional surgical emergency really does arise in which a few hours of time gained is worth more to the patient than any specialist experience.

The most likely result would be that most of Britain's present cottage hospitals will continue very much as before, but with a tendency for an increasing proportion of operations to be transferred to major hospitals, as transport and organization improve.

HIGHER-POTENCY PENICILLIN

(Abstracted from the *Pharmaceutical Journal*, 23rd November, 1946, p. 331)

A HIGHER-POTENCY penicillin which is claimed to retain its active properties for three years without necessity of refrigeration, has been announced by the Heyden Chemical Corporation of America.

In a white crystalline form, the penicillin is said to possess a potency of 1,667 units per milligram.

DRUGS ACT, 1940

(Abstracted from *Science and Culture*, Vol. 12, No. 7, January 1947, p. 338)

REALIZING the serious situation arising out of the indiscriminate adulteration of drugs and chemicals in India, the Government of India appointed a 'Drugs Enquiry Committee' in 1930-31 with Lieut.-Colonel Sir Ram Nath Chopra as its Chairman. This Committee recommended:

(1) A drugs and pharmacy legislation on the lines of those existing in Great Britain and America.

(2) The establishment of a standardization laboratory to test and analyse the products and give authoritative opinion on the quality and potency of the drugs manufactured, imported and distributed for sale in India.

Pursuant to the above recommendations, 'The Drugs Act, 1940' (Act No. 23 of 1940) received the assent of the Governor-General on the 10th April, 1940. The implementation of the act, however, could not be given effect to owing to the war. The Government of India have now published a set of detailed rules under the Drugs Act, 1940 (see *Gazette of India*, dated 22nd December, 1945) and it is contemplated to enforce these rules from 2nd February, 1947.

This would involve the setting up of Central and Provincial Standardization Laboratories and an inspectorate charged with the duties of invigilation of drug manufacturing and distributing centres that would ensure the quality and potency of the medicaments.

MEDICAL FACILITIES FOR INDIANS IN EAST AFRICA

THE opening of the Pandya Memorial Clinic in Mombasa furnishes an example of self-help by Indians abroad.

There has been great need of hospital facilities for Indians in East Africa and this institution, it is hoped, will fill a useful rôle by providing medical and surgical facilities for Indians. It will also be a training centre for Indian nurses.

The institution, which has been established in memory of the late Mr. J. B. Pandya, will be run and staffed by Indians and will be equipped on modern up-to-date lines. Provision has been made for fifty beds to start with, and when fully equipped, the Clinic is expected to meet all the needs of the Indians in different branches of medicine.

INDIAN ASSOCIATION FOR THE STUDY OF HISTORY OF MEDICINE

(Abstracted from *Current Science*, Vol. 16, February 1947, p. 49)

At a meeting of the members of the staff of the Madras Medical and the Stanley Medical Colleges, held on the 5th February, 1947, the above Association was inaugurated.

'GRAFTING' IS A MAGIC WORD

ACHIEVEMENTS OF PLASTIC SURGERY

By GEORGE BILAINKIN

MODERN plastic surgery is a miraculous art by which sufferers from appalling injuries, unsightly wounds and deformities are enabled to face the world with new confidence. 'Grafting' is the magic word, and Nature, too, is generous, helping with the provision of skin, bone or cartilage in quantity, where it can be spared, on damaged or unexposed portions of the body.

Modern achievements include the correction of protruding ears in children and adults, nasal deformities, cauliflower ears, removal of tumours of eyelids, reconstruction of cleft lip and noses that have been shot away or burnt off.

One of the outstanding successes of plastic surgical treatment is the early covering of raw surfaces with skin in the form of grafts. This prevents contracture, deformity and disability and at the same time reduces stays in hospital and long periods of painful dressings. Another is the improvements in the technique of palate repair by which bad—and often unintelligible—speech results are avoided.

Replacing missing tissues

It is the aim of all plastic surgeons to replace missing tissues as soon as practicable by similar material from sources where it can be spared with impunity—skin by skin, cartilage by cartilage, or bone by bone.

Precisely four centuries ago, plastic surgery enjoyed its first period of popularity, thanks to Gaspar Tagliacozzi, of Bologna University, Italy, although it is known that the art existed at least a century previously. In World War I, restorative surgery progressed, for 26 million became casualties.

Sir Harold Gillies, of the United Kingdom, and Mr. Wilray Blair, of the United States, led with experiments, assisted by Mr. Tom Pomfret Kilner, a young Englishman from Blackburn. He had qualified in 1912,

but war gave him new opportunities and, by 1939, he had been responsible for thousands of astonishing cases in the many hospitals to which he was attached, in Harley Street, and also at Roehampton, where he was head of the Ministry of Pensions Department.

Churchill Hospital

To-day, as holder of the only Chair of Plastic Surgery in Britain, the Nuffield Professor at Oxford University, Mr. Kilner is hopeful about the development of the Churchill Hospital in the University City. This was first used by the American Hospital in Britain before America entered World War II. It was taken over by the U.S. Army, and later used as a head injuries hospital. Then it was handed to Oxford City, and is now an annexe of Radcliffe Infirmary. As it becomes possible to staff them, the wards are being opened for all branches of surgery and medicine.

The Nuffield Department of Plastic Surgery has been given temporary premises in a Nissen hut, with offices for the director (Professor Kilner), the assistant director, the private secretary, a small library, and waiting-room, a small room for photography, and waiting-room for out-patients. So far the hospital has only 14 beds.

'It is expected in the near future', Professor Kilner told me, 'to open at least two wards to accept adult men and women, infants (i.e. those aged one to three) and children, aged three to nine. Until these wards are opened, we must continue our wartime arrangement of operating on Oxford and district cases at the Stoke Mandeville Plastic Centre, by courtesy of the Ministry of Pensions'.

At Stoke Mandeville, 110 beds are used for plastic surgery cases. The unit has had many visitors from abroad, also applications for training from people in the British Commonwealth and foreign countries. A trainee from Chile has been accepted, and is working under the auspices of the British Council; he has the advantage of watching Professor Kilner at work at the Churchill Hospital, Radcliffe Infirmary, Stoke Mandeville, and at Roehampton, and Alton, Hampshire, where work on cleft lip and palate deformities is concentrated.

'The aim of the department', says Professor Kilner, 'is that it should be a real centre for the training of plastic surgeons'.

Close co-operation

Oxford has been chosen because it offers 'magnificent opportunities for close co-operation between the clinical side of treatment and research'; it provides exceptional research facilities, and it is hoped that clinicians in the department will take a keen interest in the research side.

Professor Kilner has given up his London practice and all London hospital appointments to give him more time for these duties. He states, 'I want to carry out experiments, at any rate, in technique. We cannot make any developments here, until we have accommodation for cases. This is one of the subjects in which we cannot divorce the clinical from the research side. I have my own carefully documented and tabulated notes on 1,200 cleft lip and palate cases, each with photographs taken at several stages. I require time to analyse these records and report on my experience'.

The need for plastic surgery treatment is an ever-present one and it is estimated that 100 beds for every two million people are required.

'Industrial accidents have increased steadily in the last generation', Professor Kilner says, 'and, with higher speed in industry and transport, they are bound to become more common. One of the many things we deal with is disfigurement or disabilities caused by disease, or by the eradication of disease by x-ray radium or surgical measures'.

Burns, too, form a very large proportion of the work.

THE FACULTY OF TROPICAL MEDICINE AND HYGIENE, BENGAL

The following students are declared to have passed the D.T.M. Examination, Session 1946-47.

Passed

(Arranged in alphabetical order)

- Pankaj Kumar Banerji, M.B. (Cal.), Private Practitioner.
 Chandra Madhab Banik, M.B. (Cal.), Private Practitioner.
 Dharendra Kumar Bhattacharjee, M.B. (Cal.), Private Practitioner.
 Kalimoy Bhattacharjee, M.B. (Cal.), Private Practitioner.
 Amal Chandra Bhattacharyya, M.B., D.P.H. (Cal.), Private Practitioner.
 Mathuranath Bhattacharyya, M.B. (Cal.), Awarded the 'Chuni Lal Bose' Gold Medal 1947, Private Practitioner.
 Krishna Kumar Bose, M.B. (Cal.), Private Practitioner.
 Santosh Kumar Bose, M.B. (Cal.), Private Practitioner.
 Chacko Wallapura Chacko, M.B., B.S. (Mad.), Private Practitioner.
 Dharendra Mohon Chakraborty, M.B. (Cal.), Private Practitioner.
 Dineshchandra Chakraborty, M.B. (Cal.), Private Practitioner.
 Ram Krishna Chakravarty, M.B. (Cal.), Private Practitioner.
 Satyendu Chakravorty, L.M.F. (Bengal), Pathologist, Hasimara Central Laboratory, Dooars.
 Pramode Ranjan Chakravorty, L.M.F. (Bengal), Private Practitioner.
 Jogesh Chandra Chatterjee, M.B. (Cal.), Private Practitioner.
 Sachindra Nath Chatterjee, M.B. (Cal.), House Surgeon, Presidency General Hospital, Bengal.
 Birendra Nath Chaudhuri, M.B. (Cal.), Private Practitioner.
 Narendralal Chowdhury, L.M.F. (Bengal), Private Practitioner.
 Robi Coondoo, M.B. (Cal.), Private Practitioner.
 Gour Mohan Das, M.B. (Cal.), Private Practitioner.
 Susilendu Das, M.B. (Cal.), Private Practitioner.
 Ufulla Kumar Das Gupta, M.B. (Cal.), Private Practitioner.
 Brajodulal De, M.B. (Cal.), Private Practitioner.
 Harendra Nath Dey, M.B. (Cal.), Private Practitioner.
 Binoy Bhushan Dutta, M.B., B.S. (Rangoon), Private Practitioner.
 Sailesh Chandra Dutta, L.M.F. (Assam), Assistant Medical Officer, Itakhooli T. E., Tinsukia.
 Samuel Daniel Edwards, L.C.P. & S. (Bom.), Private Practitioner.
 Edgar Princep Gasper, M.B. (Cal.), Private Practitioner.
 Anil Kumar Ghosh, M.B., B.S. (Patna), Private Practitioner.
 Dharanikanta Ghoshal, M.B. (Cal.), Private Practitioner.
 Jyoti Prosad Gupta, L.M.F. (Bengal), Private Practitioner.
 Chamlong Harinasuta, M.B. (Bangkok), Private Practitioner.
 Kahan Chand Kandhari, M.B., B.S. (Punjab), Private Practitioner.
 Purnendu Narayan Khan, M.B. (Cal.), Private Practitioner.
 Trimbak Ramchandra Kirtanc, M.B., B.S. (Bom.), Private Practitioner.
 Siba Brata Mandal, M.B. (Cal.), Private Practitioner.
 Krishna Chandra Majumdar, M.B. (Cal.), Private Practitioner.
 Dines Chandra Majumder, L.M.F. (Assam), Dimukhi T. E., Doom Dooma.
 Hirendra Nath Maulik, M.B. (Cal.), Private Practitioner.
 Rama Shankar Misra, M.B., B.S. (Lucknow), Private Practitioner.

Mohd. Yusuf Khan, M.B., B.S. (Mad.); Assistant Surgeon, Bilaspore.
 Ambinda Bihari Mukharji, M.B. (Cal.), Private Practitioner.
 Bijoy Mukerji, M.B., B.S. (Patna), Private Practitioner.
 Abonindra Nath Mustafi, L.M.F. (Bengal), Private Practitioner.
 Sanatan Nandi, M.B. (Cal.), Private Practitioner.
 Benoy Kumar Nandy, M.B. (Cal.), Private Practitioner.
 Panchanan Nandy, M.B. (Cal.), Private Practitioner.
 Samchai Nilasena, M.B. (Bangkok), Medical Officer, Siriraj Hospital, Bangkok.
 Kailash Chandra Pasi, M.B., B.S. (Punjab), Private Practitioner.
 Sreemohan Paul, L.M.F., L.T.M. (Bengal), Private Practitioner.
 Ram Rasayan Ray, M.B. (Cal.), Private Practitioner.
 Satyendra Prasad Roy, L.M.F. (Bengal), Private Practitioner.
 Mano Mohan Saha, L.M.F. (Bengal), Private Practitioner.
 Nripendra Nath Sanyal, M.B. (Cal.), Private Practitioner.
 Ramkrishna Satija, M.B., B.S. (Bom.), Private Practitioner.
 Mani Bhushan Sen, M.B. (Cal.), Private Practitioner.
 Sachindra Nath Sen, M.B. (Cal.), Private Practitioner.
 Anil Behari Sen Gupta, M.B. (Cal.), Private Practitioner.
 Shaikh Mahboob Sadiq, M.B., B.S. (Punjab), Private Practitioner.
 Syed Shauket Ali, M.B., B.S. (Punjab), Private Practitioner.
 Mafizuddin Sirker, L.M.F. (Bengal), Private Practitioner.
 Shukdeo Prasad Sinha, M.B., B.S. (Patna), Medical Officer, District Board, Monghyr.
 Bundham Sundharagiati, M.B. (Bangkok), Private Practitioner.
 Syed Safdar Ali Khan, M.B., B.S. (Patna), Private Practitioner.
 Naresh Chandra Talapatra, M.B. (Cal.), Private Practitioner.
 Sant Ram Vaidya, L.C.P. & S. (Bom.), Private Practitioner.

EXPANSION OF HEALTH SERVICES

DEMOBILIZED MEDICAL PERSONNEL FOR CIVIL EMPLOYMENT
 (From the Press Information Bureau, Government of India, dated 11th May, 1947)

'More doctors, more nurses, more hospitals, more health workers in rural areas—these are some of India's most pressing needs in a major department of nation-building. The existing health services, in spite of their best endeavours, are able to do little more than meet a fraction of the people's needs, owing largely to an insufficiency of personnel'. This was the opinion expressed by a spokesman of the office of Director-General, Indian Medical Service, during the course of an interview.

One source to which health authorities throughout India could with advantage turn was the Army where demobilization was releasing large numbers of trained men for civil employ. Some Army medical officers have had more than five years' commissioned service to their credit, and many have undergone intensive training at Poona and other medical centres in India, besides serving in some of the best equipped military hospitals at home and in other countries.

It was revealed that up to the end of February 1947 3,502 out of a total of 8,590 medical officers had been released, of whom 1,192 have been provided with employment. The figure is small as against the potential demand. The Bhoré Committee has reported that in figures of general mortality India occupies the fifteenth position in a list of 17 countries. New Zealand heads the list and Australia comes second.

In the opinion of the Committee at least 50 per cent of the mortality in the country is preventable. A rapid expansion of the health services is obviously a vital need, and it is felt that local bodies and factory managements can utilize the services of a large number of the medical men already demobilized or to be released in the near future.

THE INDIAN JOURNAL OF RADIOLOGY

OWNED and published as its official organ by the Indian Radiological Association. Joint Editors: Rao Bahadur Dr. P. Rama Rau, Madras, and Dr. K. Manganath Rai, Madras. Price: Single copy Rs. 3/-.

This is a quarterly journal devoted to clinical radiology and allied sciences. The first issue contains a number of interesting articles, all of which are well written and easy to read.

The letterpress leaves nothing to be desired; but, the reproduction of skiagrams is not good. This defect will no doubt be remedied in future issues.

As a first effort all concerned are to be congratulated on a useful publication which should adorn the shelf of every practising radiologist.

BENGAL COUNCIL OF MEDICAL REGISTRATION

(Abstract of the important resolution of the Bengal Council of Medical Registration at their meeting held on the 11th February, 1947)

THE Council adopted a resolution disapproving the Bill for the Registration of Practitioners of Indian System of Medicine in the Calcutta Gazette of 28th November, 1946.

The Council endorsed the proposal of the Madras Medical Council for an amendment of the Indian Medical Council Act so as to provide for a representative of each Provincial Medical Council in that body.

The Council agreed to extend the principle of reciprocity of registration to the Orissa Medical Council, subject to approval by the Provincial Government.

D.D.T. FIGHTS TROPICAL DISEASES SUCCESSFUL CAMPAIGN AGAINST MALARIA

LARGE-SCALE use of D.D.T. and gammexane in the fight against malaria are bringing sensational results in British Guiana, though the work is still only in an experimental stage.

D.D.T. was applied for the first time in a village of 3,000 people in July 1945, and has been repeated twice.

Between 1938 and 1944 the infant mortality rate in the village ranged from 235 to 355 per thousand live births. Approximately 60 per cent of the school children showed evidence of chronic malaria.

Drop in infant mortality

In 1946, the number of births recorded was twice as great as in any of the seven years 1938-1944, and the infant mortality rate dropped to 96. In the last survey only 18 per cent of the school children showed signs of chronic malaria.

Of the colony's population of 376,000 about 266,000 live under conditions of severe endemic malaria. At the end of 1946 an area inhabited by 60,000 people had been brought under control. Plans have been prepared for this year to bring under D.D.T. protection over 80 per cent of the population of the colony at present exposed to the dangers of malaria. The 1947 vote from local revenue for mosquito control is about £35,000.

An expanding campaign is now being conducted for the control of tropical diseases like yellow fever and filariasis throughout the colony. The work is being carried out in collaboration with the Rockefeller

Foundation, the sugar industry and some mining companies.

Sleeping sickness

A Colonial Insecticide Research Team which began work in Uganda (East Africa) in 1945 has successfully dealt with the tsetse fly, the vector of sleeping sickness. Tests were carried out on two small islands in Lake Victoria, solutions of D.D.T. and of gammexane being sprayed over small scattered patches. By repeated applications of the insecticides flies were reduced to a minimum.

Tests against malaria have also been undertaken in Uganda. Solutions of the two insecticides were applied to the internal surfaces of native huts. The experiments confirmed that oil solutions of both D.D.T. and gammexane were effective to an appreciable extent in checking the seasonal rise of malaria.

The Indian Medical Gazette Fifty Years Ago

THE BUILDING COMMISSION FOR CALCUTTA

(Reprinted from the *Indian Medical Gazette*,
Vol. 32, June 1897, p. 222)

THE appointment of a Building Commission is altogether a new departure in the cause of sanitation in India, and one which will commend itself to those interested in the public health of our Indian towns. For though the Building Commission is for Calcutta only, yet there can be little doubt that its deliberations and conclusions will form the basis for consideration and guidance to all municipal authorities in India. The result cannot fail to be far-reaching, and in this respect the benefits to be secured from Sir Alexander Mackenzie's wise action possess more than a local interest.

The Resolution of the Bengal Commission appointing the Commission is as follows :—

'For some years past the Health Officer has pressed upon the Corporation of Calcutta the necessity of amending the Building Regulations in force in the Municipality, in order to make suitable provision for (*inter alia*) fixing the minimum width of public streets, limiting the height of houses in relation to the width of the streets on which they stand, controlling the construction of brick buildings on *bustee* lands, and fixing the minimum size of courtyards within houses, as also the minimum space to be left between the backs of houses for the purpose of ventilation. The subject was discussed at length in the Annual Administration Reports of the Corporation, and the Government Resolutions thereon, cited in the preamble of this Resolution; and the Lieutenant-Governor expressed his views on it in paragraph 19 of the Resolution on the Report for the year 1895-96, to which were annexed extracts from Dr. James's report on the outbreak of plague

in Hong Kong in 1894, bringing out very clearly the intimate connection between defective dwelling houses and spaces and epidemic disease. In that Resolution the Commissioners were informed that if, after considering the subject, they came to the conclusion that a special Building Act for Calcutta is called for in the interests of the health of the city, the Lieutenant-Governor would be prepared to appoint a representative commission to formulate the principles upon which such an Act should be based. Since then the spread of plague in Bombay, Poona and Karachi has given prominence to this aspect of the question, and the report of the sanitary officers deputed by the Medical Board to enquire into the condition of Calcutta, has shown to what an extent overcrowding prevails in Calcutta, and how the construction of buildings in the older part of the town impedes or renders impossible any effective conservancy. In the letter of the 28th December, 1896, the Lieutenant-Governor pressed the Commissioners to come to an early decision on the question put to them in the Government Resolution referred to above, and in their reply they unanimously consented to the appointment of a commission on the understanding that they would make a thorough enquiry into the history and the operation of the existing law and bye-laws on the subject, and would ascertain in what respects these have proved defective, and whether a new Building Act is necessary, or whether the case can be met by amending the existing law. The Lieutenant-Governor generally accepts this view of the functions of the Commission. It has always been his intention that a thorough enquiry should be made into the history and operation of the existing law and bye-laws bearing on this subject, and such an enquiry must necessarily be undertaken before any scheme for fresh legislation can be drawn up.

The task of the Commission will be intricate and difficult. They will have to deal with mixed questions of law, sanitation and engineering, and will further have to consider to what extent the principles recognized in European enactments relating to town buildings require to be modified with reference to the soil, climate and rainfall of Calcutta, the prevailing diseases, and the habits of all classes of the population. For these reasons, and as the proposal to amend the present law has given rise to some apprehensions among the leaders of Native society, the Lieutenant-Governor thinks it desirable that the Commission should be presided over by an officer of judicial experience. The Honourable Mr. Justice Trevelyan, who possesses great knowledge of Calcutta, and has had much experience of the working of the present law, has consented to fill the post of President. His appointment has been approved by the Government of India, and the Honourable the Chief Justice has rendered it possible for him to undertake the work by kindly consenting to

relieve him of Court duties on the days when the Commission sits.

The Lieutenant-Governor is accordingly pleased to appoint the following gentlemen to form the Commission :—

The Hon'ble Mr. Justice Trevelyan	..	President.
The Hon'ble Mr. H. H. Risley, C.I.E.	}	Members.
The Hon'ble Mr. J. G. H. Glass, C.I.E.		
Mr. H. C. Williams		
Mr. A. J. Hughes, C.I.E.		
Babu Kaly Nath Mitter		
Babu Nolin Behari Sircar	}	Secretary.
Surgeon-Captain H. J. Dyson		
Mr. W. Banks-Gwyther		
Mr. F. G. Wigley	

The Commission will be requested to enter upon their labours at once and to report to Government the results of their deliberations within the next six months.

As regards the direction, character and limits of their enquiries, the Lieutenant-Governor desires to give the Commission a perfectly free hand. It is, however, suggested that in addition to the specific points which have from time to time been touched upon in the Health Officer's reports, the Commission might usefully enquire into the desirability of opening out the congested tracts of Calcutta and the most feasible plan of effecting this. They need not, perhaps, unless they themselves find it desirable or necessary, go into the details of any particular scheme of street improvement, but they should examine the general principles on which such operations ought to be conducted in order to make them financially, as well as structurally, successful. It is very important to consider whether the special circumstances of Calcutta point to any amendment or modification of the ordinary Law of Land Acquisition. The issue which lies in fact at the root of the whole enquiry is, to what extent and in what directions private rights may equitably be made to give way to public needs. The Commission also will not fail to consider whether different sets of Building Regulations are not desirable for different quarters of the town, looking to the local circumstances of these areas.

The selection of the Honourable Mr. Justice Trevelyan as President is one which will meet with unqualified approval. He is an old resident of Calcutta and well-acquainted with the habits and wants of the people, while his judicial experience renders him specially qualified to deal with conflicting interests and opinions.

The Commission, we think, is representative and is especially strong on the engineering side. This, with one exception, is as it should be, the exception being that the medical side of the Commission is only represented by one member. Considering that the question dealt with is quite as important from a medical point of view as from the engineering, this omission appears to us to be an important defect which we hope there is yet time to rectify.

LONDON LETTER

(Reprinted from the *Indian Medical Gazette*, Vol. 32, June 1897, p. 228)

IN a former letter I mentioned the formation of the Clinical Research Association, whose purpose is to assist medical practitioners in those special scientific investigations, pathological, bacteriological and clinical, without which, in these days, the practice of medicine is blind and inept. From the second annual report of the Association, which has recently been distributed, it is evident that the scheme has become a great success and supplied a decided want. The list of subscribers is now not far short of 2,500, and they belong to all parts of England, Scotland and Ireland. Membership, for which fee is one guinea, entitles to have work done at considerably lower charges, and to receive bottles and boxes for transmitting specimens, but the Association is open to all, and the terms for the various examinations made, which of course vary considerably according to the nature of them, are very moderate. For example, a member may have phthisical sputum examined for 2s. 6d., diphtheritic membrane for 7s. 6d., urine analysed qualitatively for 3s. 6d., and quantitatively for 5s., a Röntgen photograph taken for 10s. 6d., and material analysed for poison £2 2s.; the same work being done for non-members at 3s. 6d., 10s., 5s., 7s. 6d., 15s., and £3 3s. During the year 1896, 7,227 investigations were made, 1,500 of these were analyses of urine; 908 examinations of diphtheritic membrane; 22,417 of sputum and a large number of specimens of water, milk, and other materials were dealt with chemically and bacteriologically for various purposes. The help which these enquiries must render to medical men who have not the time, the appliances, nor the aptitude to conduct such researches, is of incalculable value, and the standard of practice must be greatly raised by this enterprise.

The report deals with the work of the year in a very instructive fashion commenting on the nature, result, and use of the chemical, microscopic and other processes resorted to, and pointing out difficulties, doubts, advances and desiderata in the light of the present scientific status. It also gives instructions for the selection and transmission of specimens. It is very significant of the value which the profession and public attach to these proceedings that some of the high-class London chemists have organized laboratories in which similar work may be done on reasonable terms. The preparation of serums and animal extracts has also become a substantial branch of the trade. In this line the well-known and enterprising firm, Messrs. Burroughs, Wellcome and Co., are well to the front.

Two deaths have recently taken place in this country which merit prominent notice in the *Indian Medical Gazette*. One is of Surgeon-General James Tyrell Carter Ross, F.R.C.S., which

occurred at Rhyde on the 27th of April. This officer is best known as an energetic and popular secretary of the Bengal Medical Department and editor of the journal during the years 1868 to 1870. Having succeeded him in both these offices, I know well how he put his heart and soul into his work and strove to maintain the honour and efficiency of his department at a time when many influences were in operation to reduce its prestige and limit its usefulness. Ross was born in 1823, and had therefore at the time of his death completed 74 years. He studied medicine in St. George's Hospital School and entered the service in 1845. For the greater part of his career he was employed on the N. W. Frontier. He took part in the Sutlej campaign, and subsequently in the mutiny operation. He was appointed Civil Surgeon of Simla and subsequently selected by Inspector-General of Hospitals J. Murray as his secretary. He drew up some admirable reports of the native army, civil dispensaries, vaccination and lunatic asylums, and strove to infuse a spirit of enthusiasm and energy into the medical executive of all grades. He devoted much time and labour to his editorial duties, and the volumes of this journal which he published present a very interesting view of the events, scientific and administrative, of the time. On his promotion to the rank of Deputy Surgeon-General he volunteered for service and was appointed principal medical officer of the Force that was sent against the Duffla Hill tribes. The remainder of his service was spent in charge of the Saugor circle of medical administration. He retired in 1877, and subsequently proceeded to South Africa for the purpose of superintending nursing arrangement in the Zulu campaign. He obtained the Empress of India Medal in 1877, and was made Companion of the Order of the Indian Empire in 1878. Ross without being a brilliant or talented man was endowed with ambition, energy and common sense, and these qualities, coupled with a high sense of honour and love of his profession and service, rendered his life stirring, useful and productive. Deputy Surgeon-General Henry Vandyke-Carter, M.D. (Lond.), who died of phthisis at Scarborough on the 4th of May *at*. 66, was a great man, and has left an enduring mark on many fields of research. Son of an artist he employed his pencil, as well as his scalpel, microscope and pen to good effect, and behind these gifts of demonstration were the enquiring mind, indefatigable industry, and highly cultivated faculties of observation and reasoning.

He studied in University College, London, and was employed as Demonstrator of Anatomy in St. George's Hospital School before he entered the Bombay Medical Service in January 1868. It was while working at St. George's that he executed those illustrations of Gray's Anatomy, which so many generations of students have found so valuable and helpful. Soon after arrival in India he was appointed

Professor of Anatomy and Physiology in the Grant Medical College and Second Surgeon of the Jamsetjee Jeejeebhoy Hospital. He was also Curator of the College Museum. He subsequently was appointed Civil Surgeon of Satara and Superintendent of the Gaol. In 1872, he took furlough and employed his holiday by visiting Norway, Italy, Greece and other places in order to study leprosy and the disease now known as oriental sore. On his return to India he was deputed to investigate leprosy in Kathiawar, and afterwards to enquire into the nature of the fever which raged during the great famine of 1877-78. He identified it as relapsing fever, and discovered the spirillum which had previously been described by German observers as inhabiting the blood in this disease. This work on spirillum fever is a standard one. He suffered twice from this fever, and was obliged to take sick leave in 1882-83, during which time he devoted himself to literary and scientific work. During the later years of his service, he filled the important office of Principal of the Grant Medical College and First Physician of the J. J. Hospital. He retired in July 1888. In addition to leprosy, Delhi boil and spirillum fever, Carter also worked at mycetoma, lymph serotum, typhoid ulcers, chyluria, 'surra', the malarial parasite, and other pathological subjects. Whatever he did was well done, and his contributions to medical science are good in quality and quantity. On leaving India he endowed a Lectureship in Physiology. He was awarded the Steuart Pathological Prize by the British Medical Association, was appointed Honorary Surgeon to the Queen, and promoted to the rank of Deputy Surgeon-General in 1890. These rewards appear very paltry in view of the distinguished public labours, and eminent services to science wrought by this gifted and most diligent man; but if he did not receive decoration or title, he earned a nobler recompense in the admiration, gratitude and respect which have been, and will continue to be, accorded to his life and work by those who know them best

14th May, 1897.

Current Topics, Etc.

Folic Acid

(From the *Pharmaceutical Journal*, Vol. 157, 31st August, 1946, p. 129)

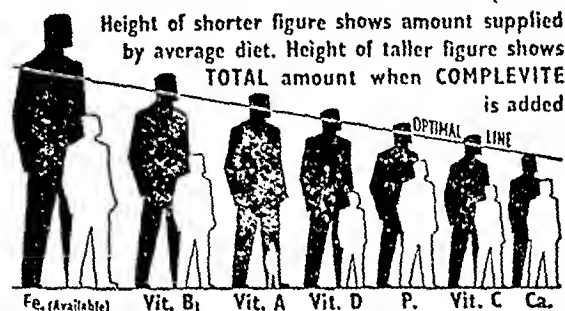
CERTAIN amount of mystery has somewhat surprisingly developed over the manufacture and use of folic acid. This substance, a constituent of the vitamin B complex and originally prepared from liver, has now been synthesized and its formula elucidated. According to Angier and co-workers (*Science*, 1946, 103, 667), it is a compound of 2-amino-4-hydroxy-6-methyl pteridine and p-aminobenzoylglutamic acid, and its identity with the natural product has been confirmed by a comparison of the ultra-violet light

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Fig. 1

ber the Elastoplast was removed. There was no tenderness or pain on gripping and the patient was discharged.

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Fig. 2



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WOMEN AND THE CLIMACTERIC

For thousands of women who undertake heavy tasks through employment—and even in the home—muscular pains, backache and headache are the inevitable results of too-prolonged efforts.

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absorption spectra of the two substances—the spectra are identical. Moreover, according to Amill and Wright (*J. Amer. Med. Assoc.*, 1946, **131**, 1201), the infra-red and microscopical appearances of the two crystalline substances are similar. It was at first thought that the liver principle with which folic acid is identical was the factor responsible for the action of liver in controlling pernicious anaemia, but although this is in fact the action of folic acid it is now thought unlikely that the two substances are identical.

Folic acid is given by the mouth, by intramuscular injection, or by intravenous drip. Generally speaking, the American workers have given much larger doses than have British physicians. By the mouth the initial dosage has ranged from 150 mg. to 20 mg., with a maintenance dose of 25 mg. to 10 mg. By injection 150 mg. has been given by intravenous drip, or 75 mg. intramuscularly, the solution being prepared by neutralization with sodium bicarbonate (an equal weight) or with the aid of disodium phosphate, and the solution sterilized by heating in the autoclave at 15 lb. pressure for 15 minutes.

Evidence is accumulating that folic acid has an important place in the treatment of pernicious anaemia. As Amill and Wright point out, since Minot and Murphy introduced liver therapy no other substance, except stomach extract, has produced the marked response now shown by folic acid. Admittedly, the number of patients so far treated is small—supplies are at present exceedingly limited—but those clinicians who have tested the compound are unanimous in reporting favourably on its effects. Wilkinson, Israels and Fletcher, for example, report (*Lancet*, 1946, *ii*, 156) as the result of an investigation at Manchester, that the indications are that 'folic acid can safely be substituted for liver extracts at least in the early stages of treatment of true pernicious anaemia'. The success so far obtained from folic acid will serve as a stimulant to a more intensive search for the true liver principle—it is unlikely that further work will show beyond dispute that in folic acid we have an antianemic factor which cannot be surpassed. Indeed, one case has already been reported where a patient responded to liver extract, but failed to improve under folic acid treatment.

2-Thiouracil in the Treatment of Congestive Heart Failure

By E. P. SHARPEY-SCHAFER

(Abstracted from the *British Medical Journal*, *ii*, 14th December, 1946, p. 838)

'CLINICAL improvement' in patients with severe chronic congestive failure may be defined as a change which shows itself by a fall of venous pressure towards normal levels and an increase in exercise tolerance, which allows the patient to get about or to leave hospital. This definition covers both the high-output and the low-output groups. The data presented in this paper suggest that some cases which have reached a chronic state on ordinary methods of treatment will show 'clinical improvement' when the activity of the thyroid gland is depressed by thiouracil. No benefit can be expected in cases which are becoming rapidly worse, since there is probably little effect on thyroid activity under ten days.

The exact mechanism by which induction of a hypothyroid state results in improvement is still uncertain. It involves the nature of the changes producing 'congestive heart failure'—a subject on which our knowledge is as yet scanty. When the venous filling pressure is lowered by venesection or digitalis in cases of low-output heart failure, the cardiac output increases, and 'clinical improvement' is associated with increased work of the heart. In these cases, however, the oxygen consumption is unchanged as an immediate result of treatment.

Case 1 shows that the work of the heart may not change after thiouracil, and it is probable that some

cases of low-output heart failure may show increased work in the hypothyroid state. In cases treated with thiouracil, although cardiac output may be unaltered, it is maintained at a lower filling pressure and in relation to the oxygen consumption of the individual it is relatively increased.

In cases of heart failure with emphysema it is encouraging that even a few cases can be improved sufficiently to leave hospital.

Regressive Changes in Leprosy under Promin Therapy

By G. L. FITE

and

F. GEMAR

(From the *Southern Medical Journal*, Vol. 39, April 1946, p. 277, as abstracted in the *Tropical Diseases Bulletin*, Vol. 43, August 1946, p. 751)

THIS important paper records the results of the use of promin in the treatment of leprosy over a period of four years. Daily intravenous doses, usually of 5 grammes, have been given over periods of three weeks, with an interval of one week between the courses. In some cases this treatment was continued for more than 4 years with beneficial results in nearly all. Clinical improvement is slow and reduction in the number of lepra bacilli still slower, but progress is nearly always steady, and relapses or febrile exacerbations very rare. Repeated microscopical examinations of the skin lesions showed disappearance of inflammatory signs and diminution in the number of bacilli, but the latter often did not disappear completely, although typical cigar-like packets of organisms became extremely rare. The greatest decline in the number of organisms was seen during the fourth year of treatment, by the end of which they had disappeared from 21 of 42 patients. With one exception the skin lesions showed extensive evidence of atrophy. The deeper foci of infection showed the greatest diminution in size and in the number of bacilli; this may be due to the fact that there is a better blood supply at these sites, which brings the drug into closer contact with the bacilli. The lipoids in the affected tissue remain undiminished, and many vacuolated fatty cells persist. Fibrosis is not a feature of regressive lesions.

The drug appears to act by ridding the blood vessels of lepra bacilli and so preventing their spread throughout the body to form new and progressive lesions. There is little evidence that promin destroys the bacilli in the tissues, but they gradually decrease in the old lesions in accordance with the self-healing tendency of leprosy. This explains the slowly beneficial action of the drug. The absence of acute reactions strongly suggests the destruction of the organisms in the blood and the prevention of their dissemination through the body as the essential action of this treatment, and their gradual reduction in the tissues to the point of final disappearance, as was observed in 10 out of 32 cases treated for four years. A still more powerful bactericidal agent is required for the chemical destruction of bacilli within the tissue cells, and research with drugs of allied composition seems most likely to furnish this requisite.

Leprosy : A New Outlook

By B. MOISER

(Abstracted from the *East African Medical Journal*, Vol. 23, October 1946, p. 295)

ALTHOUGH the disease is a rural, family and home disease, it does not by any means imply direct infection from man to man. Consider the case of bubonic plague. We know that this disease is transmitted from

man to man by the flea of the rat. This fact was discovered by careful research. Is it not possible that Hansen's disease may be transmitted by other similar means, by an intermediary? My own investigations have been with the cockroach, because they are universally present, and because I found acid-fast organisms in them, and not in any other insect examined. It may even prove that the disease is primary in the cockroach, and secondary in man.

The following facts have already been elucidated at Ngomahuru Hospital, S. Rhodesia:—

1. Cockroaches bite man voraciously at night, producing large wounds and scars.

2. These wounds and scars have repeatedly been found to contain the bacillus of Hansen (*Mycobacterium lepræ*).

3. Cockroaches ingest the bacillus of Hansen in great numbers when fed on positive material taken from patients, and the bacilli can be found in the gut of the roach up to the 19th day after feeding. They are sometimes found in such large numbers as to suggest multiplication in the roach.

4. Bacilli can be found unchanged in the dried droppings of the roach for several months, sixteen months being the longest period recorded so far.

5. Twenty-three per cent of roaches caught in the thatched huts of patients in Ngomahuru have been found to contain *M. lepræ*.

6. Five cases are recorded of the presence of acid-fast bacilli, indistinguishable from the bacillus of Hansen in roaches caught in native huts several miles from Ngomahuru, in kraals where no case of leprosy has occurred.

7. In one kraal in Gutu province, from which 9 cases have been admitted at various times, the last being on 5th August, 1940, acid-fast bacilli indistinguishable from *M. lepræ* were found in a roach caught on 18th September, 1945, i.e. 5 years after the occurrence of the last case of the disease in man.

8. Bacilli have been found in the faeces of a series of five roaches, each fed on the powdered dry faeces of its predecessor. How many more can be added to the series is not yet known, but it appears to go on indefinitely, so that it is my contention that it is the faeces of infected cockroaches that are the real source of infection in leprosy.

In about 70 per cent of all cockroaches examined during the last few years, there have been found small acid-fast oval bodies generally a little larger than a red blood corpuscle, but varying in size, which appear to contain acid-fast rods, and it is thought that they may be a stage in the development of Hansen's bacillus in the roach. Occasionally, these oval bodies have been found ruptured, allowing of the escape of the contents, rods or amorphous material. These oval bodies have been observed in man, but not in fleas, bed bugs or ticks. What is their significance? They are a matter for further investigation.

The following six items are reprinted from a Medical Newsletter dated February 1947 released by the International Press and Publications Division of the U.S. Information Service, Washington.

RE-ENFORCING INJECTIONS OF PERTUSSIS VACCINE IN PREVIOUSLY IMMUNIZED KINDERGARTEN CHILDREN

The main object of this study was to evaluate the effect of re-enforcing, or 'booster', injection of pertussis vaccine on kindergarten children who had received their original course of immunization at the Grand Rapids and Michigan City immunization clinics. The immune response of the children was measured by the opsonocytaphagic reaction in 187 children before and after a stimulating injection of plain pertussis vaccine given at the time of entry into kindergarten. Tests before the 'booster' dose suggested that a moderately high level of opsonic activity was maintained for as long as four years after primary immunization, with

the three antigens used. Tests after the 'booster' injection showed reactions on the average 1.6 times those before the injection, and the average increased from the moderate range to that of strong reaction. The results lend experimental support to the policy of giving a 'booster' injection of pertussis vaccine to children just before they start to school when the likelihood of exposure to whooping cough is greatly increased.

(Kendrick, Pearl *et al.*: Re-enforcing or 'Booster' Injection of Pertussis Vaccine in Previously Immunized Children of Kindergarten Age. *Pertussis Field Series V. Am. J. Dis. Child.*, 72, 382, October 1946.)

WATER, SALT AND HEAT EXCHANGES OF MEN IN TROPICAL AND DESERT ENVIRONMENTS

This report is based on comparative field studies of men observed in the California desert and the Florida tropics. The results show that the thermal stress in the desert is about 2 to 3 times greater than in the tropics. A tropical jungle-swamp, however, may exert a stress similar to that of the desert shade. Average 24-hour fluid intakes and sweat outputs were about two times greater in the desert than in the tropics, but the average urinary volume and urinary salt excretion were the same in both environments. Thus men increased their water and salt intakes in proportion to increased losses. Evaporative losses were correlated with solar intensity and dry-bulb temperature, but no correlation could be shown with relative humidity, air movement, or rectal temperature. Clothing diminished evaporative loss by about 100 grams per hour. In the tropics, about 72 per cent of the heat due to work was lost by evaporation, but in the desert all of this heat must be lost by evaporation.

(Molnar, G. W., *et al.*: A Comparative Study of Water, Salt and Heat Exchanges of Men in Tropical and Desert Environments. *Am. J. Hyg.*, 44, 411, November 1946.)

CLINICAL SIGNIFICANCE OF CERTAIN CHANGES IN ELECTROCARDIOGRAM IN ARTERIAL HYPERTENSION

The author analysed 100 selected cases of arterial hypertension and correlated the clinical features with limb lead electrocardiogram in each case. Inversions of T-waves and ST segment depressions in Lead I or in Leads I and II were associated primarily with high diastolic arterial pressure, coronary sclerosis, and hypertrophy of the heart as a whole. These ST-T changes were not significantly related to an increase of thickness of the left ventricular wall relative to that of the right ventricle.

The poor prognosis usually associated with this electrocardiographic pattern was shown to depend largely on other prognostic signs. The pattern of 'left ventricular strain' was not in itself an indication that the myocardium had failed or was about to fail. It was concluded that the preceding duration and severity of cardiac failure are not reflected by the leads. Apparently the degree of left ventricular preponderance cannot be inferred. Finally, the Johns Hopkins investigator says that the likelihood of early death or future cardiac failure cannot be ascertained from the type of electrocardiographic change alone.

(Filley, Giles, F.: The Clinical Significance of Certain Changes in the Limb Lead Electrocardiogram in Arterial Hypertension. *Bull. Johns Hopkins Hosp.*, 79, 261, October 1946.)

STREPTOMYCIN IN THE TREATMENT OF CLINICAL TUBERCULOSIS

This report is based on observations of the effect of antibiotic treatment with streptomycin of 75 cases of tuberculosis. The types of tuberculosis were as follows: miliary, 3 cases; meningitis, 7; pulmonary, 24; ulcerating lesions of upper respiratory tract and large bronchi, 6; cutaneous fistulae of neck, thorax and abdomen, 8; empyema, 7; kidneys and bladder, 14; lupus, 3; bones and joints, 4; and peritonitis, 3. All of the patients with miliary tuberculosis died following temporary improvement. Four of the seven with

meningitis were living and improved at the time of making the report.

Of the 24 cases of pulmonary tuberculosis the lesions appeared to be halted during treatment though three of the patients were unimproved and two deaths occurred in those in whom treatment had been started in a terminal phase of the disease. In the other types of tuberculosis results of streptomycin treatment were not definite or difficult to evaluate. From these studies it was concluded that streptomycin is a therapeutic antibiotic substance highly effective against tuberculosis of experimental animals and is of low toxicity for man.

The results observed are consistent with the hypothesis that streptomycin exerts a suppressive effect on the progress of tuberculous infection in man. Limitations to the intensity of the antibacterial activity and possibly to its duration have been demonstrated. Streptomycin may represent the first clinically feasible antibiotic remedy for tuberculosis, but at this time it cannot be recommended as a substitute for accepted therapeutic procedures, the efficacy of which have been proved by long experience.

(Hinshaw, H. Corsin, *et al.*: Streptomycin in Treatment of Clinical Tuberculosis. *Am. Rev. Tuberc.*, **54**, 191, September 1946.)

THE EFFECT OF ANTICOAGULANTS ON PENICILLIN THERAPY FOR SUBACUTE BACTERIAL ENDOCARDITIS

No statistical, anatomic or histologic evidence could be found that anticoagulants are a necessary adjunct to penicillin therapy of subacute bacterial endocarditis. If the daily dose of penicillin is adequate and treatment is continued long enough, healing of the vegetations will take place as well without as with anticoagulants. The rate of recovery was 100 per cent in our latest 15 consecutive cases, in most of which the patients daily received 1,000,000 units or more. All these patients were treated without the use of anticoagulants.

It is doubtful that anticoagulants prevent major embolism. Fatal hemorrhage resulting from the use of anticoagulants was suggested, although not proved, in two of the cases. The additional cost which is large when heparin is used, as well as the expense and inconvenience to the patient of daily determinations of coagulation or prothrombin time, does not seem justified.

(Priest, Walter S., *et al.*: The Effect of Anticoagulants on the Penicillin Therapy and the Pathologic Lesion of Subacute Bacterial Endocarditis. *New England J. Med.*, **235**, 699, November 1946.)

EFFECT OF INTRACEREBRAL INJECTIONS OF INFLUENZA VIRUSES

It is quite frequently observed that the degree of prostration during and following an attack of influenza in human beings may be out of proportion to the clinical signs observed. Consequently, a series of studies were made, of which this paper is one, to study the toxic properties of the influenza virus in greater detail. Intracerebral injection of preparations of influenza viruses into mice led to tonic and clonic convulsions and death usually within 24 to 72 hours. Histological examination revealed the destruction of the ependymal lining of the ventricles as the dominant finding.

Propagation of the influenza viruses in the central nervous system could not be demonstrated and, in fact, the agents were no longer demonstrable in four days. It was concluded that the observed neurological reactions were the result of toxic activities rather than of virus propagation.

The toxic agents could not be separated from the infectious particles by the use of such techniques as differential high speed centrifugation, absorption onto and elution from chicken red cells and precipitation by protamine. The toxic effect of influenza A virus preparations was specifically neutralized by anti-influenza A and not by anti-influenza B serum and conversely. In addition, antigenic differences were

noted between two strains of influenza A virus by this method of testing.

(Henle, Gertrude and Henle, Werner: Studies on the Toxicity of Influenza Viruses. 1. The Effect of Intracerebral Injection of Influenza Viruses. *J. Exper. Med.*, **84**, 623, 1st December, 1946.)

Nutritional Survey for New Guinea Aborigines

By EDGAR BEE

(Received from Australian High Commissioner's Office, Australia Office, Connaught Place, New Delhi)

WHEN Australian soldiers fought in steaming jungles and on razor-back mountains of New Guinea, their stretcher-bearers in this savage tropic land were aborigines.

The 'fuzzy-wuzzies' as they were affectionately called carried wounded men scores of miles through fever-ridden swamps, along jungle tracks, down precipitous slopes, across swaying catwalks of emergency bridges spanning swift rivers. These primitives—many of them head-hunters not so long ago—showed devotion, astounding gentleness, and care, and such disregard for their own lives, that the Australian people were profoundly moved.

One effort to repay what can be repaid of that still-acknowledged debt to the peoples in the Territory of Papua and New Guinea, is already under way in the shape of a nutritional survey unique in the Pacific region. Responsible authorities are the New Guinea Administration and the Australian Institute of Anatomy, Canberra.

Australian scientists selected for the job are mainly from the Institute, and include two women nutritionists. The women are essential to the success of the expedition, because, among New Guinea primitives there are strict sex taboos regarding preparation and serving of some foods. To get this data will probably be the most formidable task of the expedition. Data on female reproductive history can also be best obtained by women.

The two nutritionists will study in detail, with measurements as far as possible, the food actually cooked and eaten by representative households in each selected village.

The survey will be well based. 'To-day in nutrition we are getting back to the fundamental of food, rather than seeking to isolate and analyse vitamins', says Dr. F. W. Clements, Director of the Institute.

'For this survey our criterion is absolute: how well does the aborigine compare with what we think is his optimum possible condition?'

Fundamental reason for the expedition is the desire of the administration to stimulate local production, so as to introduce more native-grown foods into the ration scale of aborigines, in place of, or to supplement, imported rice. This is a long-term as well as immediate problem.

Before it can be done, the dietary plan of the aborigine in his village must be known. Existing knowledge is scanty.

'We know that he eats certain staples, such as fish, taro, sago, sweet potatoes, but do not know in what quantities', Dr. Clements explains. 'We have to find out exactly what he eats, and how much. From that we can determine what he needs.'

The expedition's aim is to determine the 'nutritional status' of the aborigines. Nutritional status is measured by the general standard of health, physical appearance, mortality rates, the presence or absence of deficiency diseases, and so on. Here again, existing knowledge is limited.

It is known that there is very little beri-beri, but there might be the early stages of deficiency diseases. Aborigines will be examined and laboratory tests will include those of blood and urine. X-ray tests will be made of bones, particularly those of infants, for the degree of mineralization.

A parasitologist will examine debilitated aborigines to determine whether the condition is due to chronic diseases (possibly caused by parasites) or to food deficiencies.

Recommendations will be made on actual dietary patterns. These will be aimed to guide the administration in encouraging the aborigines to grow the things they are missing from their present dietary. Hence the party will have an agriculturist—an administration officer resident in New Guinea and with first-hand experience of agricultural conditions there.

Comparative nutrition surveys will be conducted on five or six groups, eating different staples—such as fish, taro, sago.

One village has been definitely selected—Busama, between Lae and Salamaua in New Guinea. Another village will be within the region of the road to Wau up the Markham Valley. A third will be a fishing village in the Trobriand Islands.

The war has had both good and bad effects on the aborigines. One benefit has been the introduction of beans and peanuts into areas where they had never before been grown. Also, the use of corn is spreading, and contacts have widened.

'But some of the inhabitants are pretty badly off as a result of the war', says Dr. Clements. 'Both Japanese and our soldiers—often under the spur of hunger—pillaged their gardens. This happened particularly around Lae, and in other places. Most of the gardens were put back into condition within a year of the war's end, provided seed was available. The aborigines depend on last year's crop for this year's seeding. I understand that in most areas the gardens are fairly well established again.'

'Cocconut palms were heavy sufferers in many areas, and will take time to regrow. But cocoanuts are not a prominent article of diet except amongst the sago-eating people, for whom cocoanuts form about 25 per cent of the diet.'

Perhaps the most serious war-caused shortage in village food supplies is live stock—in effect, pigs.

Sea, land and air transport will be used by the party. A schooner will probably land members and equipment on a beach near Lae. There will be motor transport in the Markham Valley for part of the way up the Wau road, and after that again, probably, the aborigine bearer will be necessary. A plane may be used to carry party and gear to an aerodrome somewhere near a village in the mountain districts.

'We will have one of the best-equipped field laboratories anywhere', says Dr. Clements. 'We have arranged for a generating power unit, an x-ray plant and a certain amount of electrical laboratory equipment.'

Trained aborigines will assist the party. On previous research work in the area, Dr. Clements used aborigines trained at the School of Tropical Medicine, Sydney. Two groups of about 12 Papuans each were trained there in 1934-35.

The survey, which is being financed through the Department of External Territories, is being done virtually for the New Guinea Administration by, and at the suggestion of, the Institute of Anatomy—the body in Australia equipped for this type of work. The Institute in the past has advised the administration on ration scales.

There have been not more than four or five such expeditions anywhere in the world to date. A survey was made in Nyasaland Protectorate, South Africa, in 1938, under the aegis of the Medical Council of Great Britain, led by Dr. B. S. Platt, Professor of Human Nutrition, University College, London. Dr. Platt is now engaged on another nutritional survey in Gambia on the north-west coast of Africa.

The Rockefeller Foundation conducted a similar survey under Dr. R. S. Harris among the desert natives of Mexico.

In China and India there have been nutrition surveys, but not among undeveloped primitive peoples.

However, nutrition is attracting increasing attention and larger allocations of funds. One might mention,

for example, the important Inst. Nacional Nutricion, Buenos Aires; also the Institute of Medical Research in Johannesburg, South Africa, which has done a lot of work among aborigines in hospital in gold mining areas.

The Australian party will be away about six months—for all the dry season in New Guinea—returning to Australia in August or September.

A party will have to return to New Guinea to do some work in the wet season.

Northern Territory Survey

The Institute is not confining its nutritional surveys to aboriginal peoples. A survey of the European people of the 500,000 square mile, almost empty Northern Territory of Australia, with some attention to aborigines also, will be undertaken by a party of three women nutritionists and a male biochemist.

Equipment will be kept down to a minimum, as the party will have to rely almost entirely on planes for transport. Medical officers of the Commonwealth Public Service stationed throughout the territory will assist them.

Food consumption of territorian housewives will be studied especially. Data will be collected on food costs, an important factor, as many foods have to be brought into the area by air, owing to vast distances in this land where average population density is only one person to every 100 square miles, and where, in monsoonal regions, land transport may be dislocated for weeks by heavy rains.

An important part of the task of the biochemist will be to estimate the vitamin C content of the blood of infants, children and pregnant women.

This survey is designed to assist the Federal Government to populate the northern half of Australia. Nothing like it has ever been attempted before in these lonely regions.

They Sweat it Out for Science

Professor Lee, Australian Physiologist, put animals, birds and humans through their paces to see how they react in conditions of extreme heat and humidity

By LARY BOYS

Canberra

(Received from Australian High Commissioner's Office, Australia Office, Connaught Place, New Delhi)

In Brisbane, capital city of Australia's sub-tropical State of Queensland, medical students and university professors work through their vacations to find out how heat and humidity affect working efficiency of humans and animals.

In charge of the experiments is energetic Dr. D. K. Lee, Professor of Physiology at Brisbane University. He first became interested in climatology at the University College, London, in 1934, and continued his research at Singapore in 1936.

The present organization began in 1937 within the Department of Physiology at Brisbane. Laboratory studies of men and animals have continued to the present time.

From 1942 to 1945, various investigations were carried out in North Queensland and New Guinea for the armed forces. During this period the nature and incidence of 'tropical fatigue' were thoroughly studied and as a result much valuable advice was made available to the Allied Forces serving in the steamy jungles north of Australia.

In a specially built laboratory overlooking the Brisbane River, Professor Lee and his assistants work through the long summer vacation when Brisbane's heat and humidity are at their peak. Human subjects, all volunteer medical students, do various kinds of work and exercise outside in the sub-tropical sunlight. Or they go into sealed chambers where any climatic conditions of heat or humidity can be reproduced by a special conditioning plant.

Sweat losses, respiratory and pulse changes are faithfully recorded by special instruments for each subject under observation, man, sheep, or domestic fowl.

Investigations carried out are prompted by practical considerations of tropical settlement, although a definite attempt is made to keep the long-range fundamental scientific requirements in mind. On the human side, attention is given to the reactions of man to various types of hot atmospheres, and the effects of clothing and housing upon his welfare in such climates.

The workers also have well in mind industrial conditions, as a result of which men spend long periods in 'tropical' weather.

As domestic animals play an important rôle in the economy of tropical habitation, their reactions are studied with particular interest. The way in which animals react, the methods of selecting those most suitable to tropical conditions, and changes made by hot climates are investigated. Information is gradually accumulating on the wider scientific problem of how animals adjust themselves to hot climates.

Interesting point confirmed by Professor Lee's department during the war was that Australian soldiers who had been born and reared in tropical Queensland perspired more 'economically' than soldiers from the more temperate parts of Australia and were less likely to be distressed by excessive heat and humidity than their fellow-countrymen from the colder South. This was despite the fact that in all cases, the soldiers examined came from the same ancestral stock—predominantly British.

Professor Lee's laboratory maintains close liaison with the Medical Research Council of Great Britain, the National Research Council of America, the American Society of Heating and Ventilation Engineers, and the Food and Agriculture Organization of the United Nations.

Professor Lee has been granted leave of absence from his duties at the University to spend the next 12 months in America. He has been invited by Dr. Isaiah Bowman, president of the John Hopkins University, to join with his staff in studies of a tropical settlement. On 18th May, Professor Lee will deliver a paper, 'Effects of heat on dairy cattle' to the American Physiological Society at Chicago.

During his stay in the United States he will do a survey of animal climatology for the Food and Agriculture Organization of the United Nations.

On his return to Australia next year, Professor Lee will resume control of Brisbane University's experiments in climatological physiology, which will continue uninterrupted during his absence.

New Approach to Health Problems

United Nations' Plans to Control Disease

By S. GORDON COLLIER

AMONG the most propitious conferences which the United Nations have yet held is that of the Interim Commission of the World Health Organization, which has recently been discussing in Geneva some of the projects which will be laid before the World Health Assembly. This Assembly is to be held within six months of the date on which 26 members of the United Nations have joined the World Health Organization and thus established it as a permanent agency.

In preparation for this general conference on health, the procedure which has proved successful in trade and other questions was followed and a preliminary conference, or Interim Commission, of 18 nations has therefore been meeting at least every four months to examine plans for the conference. The place and date of the world conference is one of the items on the agenda, the others being details of projects to be discussed at the world conference later.

First Common Interest

The world health talks have begun well, and that for three principal reasons.

In the first place, the conquest of disease was probably the first of their common interests in which the nations realized that they had nothing to lose, and everything to gain, by whole-hearted co-operation. In the second place, and for this reason, the United Nations were able to take over from the League of Nations an excellently organized health department which, though little publicized, had a long record of solid achievement behind it. And, finally, the Interim Commission is nursing the new-born baby of world co-operation with great care, teaching it to walk first through relatively simple problems, before it starts running into highly controversial or revolutionary projects.

It is a good augury, therefore, that the agenda at Geneva makes good reading for the student rather than headline news for the public.

The ultimate basis of public health administration, both nationally and internationally, are the records of sickness upon which expenditure and other plans are based. Certain aspects of these records therefore figured high on the agenda of the Geneva Conference, and notably the standardization of names for the causes of death and disease. The League of Nations made great progress towards such standards of nomenclature, and it was this which made it possible for health organizations throughout the world to get the detailed statistical summaries published by the League before the second world war. A world conference is scheduled to take place on this subject in Paris next year, and it is hoped then to carry this matter a step further.

Standardization of Records

In Britain, for instance, standardization of all kinds of sickness records has led to a unique experiment by the Bureau of Health and Sickness Records at Oxford, which is collecting all the available information about every type of sickness—not just fatal illness and notifiable diseases—in a large part of the country. Limited records have been kept for many years by various organizations, but these have either concerned all illness in a relatively small area (e.g. London, Glasgow, the New York Department of Hospitals scheme, similar local schemes in Canada, etc.), or they have been restricted to particular diseases (e.g. the records of the Birmingham Tuberculosis Department, the United States Public Health Service records of venereal disease, morbidity, etc.).

The aim of this British experiment is to tabulate all known facts about sickness in a large area covering both industrial and rural communities, and from many different independent sources, so that a far more complete picture of public health may be made available in which important new facts about the effects of different environments may be discovered.

For several years now, machines have been tabulating this information at the rate of 12,000 cards every hour, checking, counting and finally sorting them according to common facts they contain. This is the type of analysis which can only be applied internationally when the names of sicknesses have been standardized, and the progress of the Geneva Conference on this subject may well have results of much more far-reaching importance.

New Treatments

It is the treatment of disease, rather than its tabulation, however, which is the primary aim of a health service, and one of the biggest problems in this field which has had to be faced in Geneva arises from the discovery, during and shortly before the war, of revolutionary new treatments for many of the most widespread diseases.

Drugs only known to medical practitioners for a few years are now being made either under various names, or to different formulæ, or both, in many countries, and scientific literature announcing important developments in one country may therefore be either incomprehensible or inapplicable in others. Consequently, a sub-committee on biological standardization was also set up, and its work has enabled the Geneva

Conference to carry the standardization of biological and pharmaceutical products throughout the world a stage further.

Doctors in Chile, for example, where the pneumonia death-rate before the war reached 485 per 100,000 inhabitants, in Egypt where it was 317, or in Spain where it was 166, will all be better able to obtain the preparations of sulphapyridine and sulphathiazole proved most effective against this disease in Britain, where these drugs were developed.

Similarly, British developments in the use of penicillin can then be followed exactly throughout the world, just as tropical countries will be able to benefit more directly from Britain's development of the diamidine drugs for treating sleeping-sickness, kala-azar and leishmaniasis. The standardization of these medicines would undoubtedly be one of the most important steps yet taken in the world conquest of disease.

Positive Approach

Even more important than the treatment of illness, however, is its prevention, and here again the health commission has undertaken important work in reviewing the administration and revision of international sanitary conventions. Now regarded in Britain, where it was developed, as a science in its own right, sanitation has not only prevented the spread of epidemics from country to country, but has been the chief means of fostering among the peoples the new positive approach to health.

This approach is the cornerstone of Britain's own National Health Service as it is now being planned and, as new discoveries help to diminish sickness in other countries during coming years, the view that good health is a gift to be sought and developed, and not merely maintained, may well spread throughout the world.

The Care of Patients with Severe Asthmatic Attacks

By C. SUTHERLAND

(Abstracted from the *Medical Journal of Australia*, Vol. II, 13th July, 1946, p. 51)

TREATMENT

BEFORE treatment is decided on every possible means must be taken to define the factors leading to the attack to assess their relative importance and to deal with them. Results will be poor if adrenaline is poured into a dust sensitive patient who is allowed to remain in a dusty bedroom or if a child sensitive to foods or to products of intestinal fermentation is allowed to remain with a full bowel.

ADRENALINE

Mild attacks of asthma are generally relieved for several hours by the subcutaneous injection of three to five minims of adrenaline (1 in 1,000 solution). Some patients require more and those who have used adrenaline for years may need seven to ten minims or more every twenty to thirty minutes before an attack is controlled. The intelligent patient can usually give useful guidance about 'how much' or 'how often'. One should aim at using the smallest dose which will give complete relief for a few hours and for the average adult with a moderately severe attack ten minims (0.6 millilitre) is usually adequate. But it must be realized that the optimum dose for any one patient must be found by experiment.

Severe asthma may persist for days and if effective measures are not taken to relieve the bronchiolar spasm further mechanical complications such as congestion in the lung ensue adrenaline becomes less effective and the patient becomes dangerously exhausted. A few adequate doses early in an attack are much more helpful than much larger doses later on.

When one realizes that one is dealing with a stubborn attack in an adult it is as well to fill a two-millilitre

syringe with adrenaline (1 : 1,000 solution) and after consulting the patient if he is an intelligent 'oldhand' inject a suitable dose (say ten minims) then place the syringe horizontally in a sterile test tube beside the bed and wait ten minutes. If there is no sign of relief give another ten minims and repeat the dose every fifteen or twenty minutes until the attack is controlled. Overdosage is indicated by pallor, tremor and tachycardia and a feeling of general discomfort and of course these symptoms are indications not to give more for an hour or so. Tremor is perhaps the most reliable sign and is best elicited by balancing a sheet of note paper on the patient's outstretched hand. The patient's condition is indeed serious if these signs of intolerance appear before the bronchiolar spasm is relieved.

It is at this stage morphine is so dangerous and if it is given before the spasm is controlled there is great danger that the patient will cease to struggle and will lapse into unconsciousness from which he does not recover. Given early in an attack to a vigorous patient a small dose is not quite so dangerous; but those who see large numbers of severely asthmatic patients are unanimous in emphasizing the dangers of sedatives of this type.

Once spasm has been controlled to a certain extent one should see that it is not allowed to return and the optimum dose should be injected as often as necessary immediately any hint of an increase in wheezing is heard. A good plan is to leave a stethoscope with the patient and the attending nurse can soon recognize the prolonged expiratory wheeze which indicates the return of bronchiolar spasm. Some physicians leave the needle in one spot and inject one minim of adrenaline per minute. The disadvantage is that intense constriction of blood vessels occurs at the site of injection and little absorption takes place after the first few minutes.

Care must be taken not to inject adrenaline into a vein. Select an area where large veins do not occur and look carefully so that small veins also are avoided. After inserting the needle pull back on the plunger. If blood appears in the syringe withdraw the needle and try another spot. If the patient is in his own home he should be taught how to inject adrenaline (into his thigh) as in many attacks repeated small doses will be necessary.

Adrenaline may also be used by inhalation but a 1 : 100 or even 1 : 10 solution may be necessary. A spray or nebulizer is unsuitable and only a specially designed glass vaporizer giving a very fine mist must be used. Some vaporizers are badly made or the jets become blocked so that if the patient gets no relief these mechanical defects must be thought of. Great care must be taken not to inject these strong solutions of adrenaline subcutaneously in error.

It sometimes happens that patients who have had frequent injections of adrenaline become temporarily intolerant so that further doses make them worse. In such cases it is better to stop using adrenaline for twelve or twenty-four hours and to rely for a while on other remedies, especially 'Aminophylline' and oxygen. As a rule it will be found after a spell of twenty-four hours that the adrenaline is again beneficial.

A patient can be overdosed with adrenaline; but by far the commonest error is for doses to be too small and too infrequent. It is a technique to order a fixed dose of adrenaline at fixed intervals; find the optimum dose and inject it as often as necessary. This may mean an injection every hour or oftener. A patient should not be allowed to remain wheezing or obviously short of breath unless signs of intolerance of adrenaline have appeared.

The absorption of adrenaline is prolonged when it is administered in an oily medium such as peanut oil and it is sometimes more convenient to give it in this slowly acting form especially at bedtime to ensure an undisturbed night.

'AMINOPHYLLINE'

'Aminophylline' (also called 'Cardophyllin' or 'Euphyllin') is a mixture of theophylline with ethylene diamine. It is said to cause lowering of venous and

intrathecal pressure, dilatation of the coronary arteries, stimulation of respiration, an increase in the volume of blood flowing through the lungs and bronchial relaxation.

It was originally given intravenously but most authorities now prefer to give it rectally. Barach recommends injecting 0.6 gramme (0.5 gramme for small patients and 0.7 gramme for large patients) dissolved in 20 millilitres of warm water into the rectum through a soft rubber catheter, and this dose should be given twice a day for five days and then once at night for three weeks so that prolonged relaxation is established. The attack may subside after the first few doses but the full course should be given in order to produce a lasting effect. When the drug is given intravenously 0.48 gramme is dissolved in 20 millilitres of 10 per cent glucose solution and injected slowly at least eight minutes being taken. 'Aminophylline' is an irritant and must not be given intramuscularly.

OXYGEN

In the administration of oxygen, linen tents and funnels are, of course, useless, and oxygen must be given with a well-fitting mask (for example, 'B.L.B.') or through a nasal catheter (the gas should be moistened) or in a 'cellophane' tent. Give at least four to eight litres per minute if necessary for hours at a stretch. In the United States of America a mixture of 80 per cent helium with 20 per cent oxygen is found to be most effective, but it is not available in most countries. A mixture of oxygen with 5 per cent carbon dioxide is sometimes useful as an expectorant, but generally pure oxygen gives more relief.

PURGATION

The value of purgation should never be forgotten. Some stubborn attacks persist until the bowels are well opened. Probably calomel (four grains) followed by Epsom salt next morning is most effective. Bowel wash-outs are also frequently of great benefit; but if they are to be effective, the bowel should be gently washed until the return is clear with large volumes of warm tap-water or saline solution, with the aid of a funnel, a yard of tubing and a soft catheter inserted a couple of inches into the rectum.

VENESECTION

To plethoric subjects with circulatory embarrassment venesection is often of dramatic benefit. Of course, it is useless and harmful for dehydrated subjects.

ANÆSTHESIA

Asthma sometimes disappears for months after a major operation, and inhaled ether is sometimes used in stopping attacks. The patient tends to become more distressed until consciousness is lost, but the asthma disappears when full anaesthesia is reached. Generally, it is preferable to give ether rectally (two ounces in four ounces of olive oil). Urbach recommends that equal volumes of ether and olive oil should be whisked for several minutes with an egg-beater. Five to seven ounces of this golden-brown fluid are then injected rectally.

'Avertin' (60 milligrammes per kilogram) is also given rectally; the usual solvent is amylene hydrate, but, according to Coke, the drug may also be dissolved in 120 millilitres of cold distilled water. But 'Avertin' is a respiratory depressant, and as a rule, ether is preferable.

PARALDEHYDE

Two to four drachms or more of paraldehyde in four ounces of olive oil may be given into the rectum. This is often a most satisfactory remedy. Often this dose must be repeated in twelve hours.

ASPIRIN

A proportion of asthmatic patients are intolerant of aspirin, and by those it must be carefully avoided. To

most of the remainder it is beneficial, and it is well worth a trial even in desperate cases.

COCAINE

Cocaine should be avoided, as addiction can easily follow repeated use. But in desperate cases a cautiously used cocaine spray (5 per cent for the nose) or application of cocaine to the nasal mucosa is sometimes dramatically helpful. Proprietary sprays for inhalation formerly contained traces of cocaine with adrenaline and papaverine.

MORPHINE, HEROIN, ET CETERA

Given early in an attack when the patient is vigorous morphine, heroin and similar drugs are often helpful; but they must never be given when the patient's condition is causing concern, as death can easily occur after even small doses. . . . Itals they should not be given except . . . of the honorary physician or medical superintendent. Pethidine seems useful but is still under trial. Orally, an initial dose of 25 to 100 milligrammes is recommended and then 25 to 75 milligrammes two or three times a day.

IODIDES

Ten grains of potassium or sodium iodide three or four times a day should be tried in all chronic cases; but intolerance of iodides is common. As a rule it is preferable to give iodides in a simple mixture without lobelia or stramonium, which tend to upset the digestion if given for many days.

SULPHONAMIDES, PENICILLIN AND 'NOVARSENOBILLON'

Sulphonamides are sometimes helpful even when no obvious infection is present and these or penicillin are most useful when infective bronchitis and some fever have occurred. Arsenicals administered by the intravenous route occasionally succeed brilliantly especially in eosinophilic infiltration of the lung.

EPHEDRINE

Ephedrine given orally is useful in mild attacks but should not be used in severe attacks. It may produce insomnia, tremor and palpitation and these unpleasant effects are lessened to some extent if it is combined with a sedative such as phenobarbital or 'Amytal'. It can produce toxic effects and in the writer's opinion it should not be given subcutaneously.

POSTURE AND ENVIRONMENT

In a severe attack the patient should have a good pile of firm pillows or he should sit in a comfortable chair until the attack subsides. Often the patient is better on a balcony or verandah. When allergy is a factor kapok and feather pillows must be avoided and dust must be reduced to a minimum or better still the patient should be moved into hospital until the attacks subside.

DIET

Allergy to foods does not seem to be a common cause of *status asthmaticus* but many patients seem to recover more rapidly if they avoid milk and eggs for a few days. On the other hand the patient has a strenuous time during a prolonged attack and should take fruit drinks, sweetened barley water and tea when he can. If it is known that milk makes no difference he should have milk in moderate quantities and when the attacks have lessened he should have a plain well-balanced and adequate diet.

OTHER REMEDIES

Autohaemotherapy, lumbar puncture, the intravenous administration of calcium (10 millilitres of a 10 per cent calcium gluconate or calcium chloride solution) and the intravenous administration of glucose or sucrose have all been used; but it is difficult to say whether they have much real effect. Adrenaline oxygen and 'Aminophylline' are at present the only really satisfactory remedies and one must cultivate the art of using them.

The Rh Factor in Feeble-Mindedness and Other Diseases

By L. H. SNYDER

(From the *Minnesota Medicine*, Vol. 29, February 1946, p. 121, as abstracted in the *International Medical Digest*, Vol. 48, June 1946, p. 360)

'IN recent years much attention has been devoted to the study of the inheritance of various traits both normal and abnormal in human beings. Perhaps the most fascinating of these traits are the recently discovered Rh blood types. At first apparently of only theoretical and academic interest the Rh factors have become of importance in legal medicine in transfusions and in the study of infant mortality and are now extending their influence into the fields of psychology and psychiatry.'

'There are no normal antibodies against antigen Rh in human sera. . . . Rh is highly antigenic to human beings. Repeated injection of Rh+ blood into an Rh- person results in immunization of the recipient and transfusion reactions of increasing severity. It is essential therefore to transfuse Rh- blood into an Rh- person. For even though the first transfusion might cause no reaction the immunization process would be initiated and subsequent transfusion might be fatal.'

The Rh antigen has been shown to be the primary cause of erythroblastosis foetalis. 'In nearly all cases of the disease the mother proved to be Rh- the foetus Rh+. The Rh antigen in the foetus was of course inherited from the father. The Rh- mothers can be shown to have developed antibodies against Rh. Apparently the Rh antigen has passed through the placenta into the circulation of the mother, immunized the mother and the maternal immune antibody has then passed back into the foetus damaging the red blood cells. The result is hæmolytic jaundice and other effects. While the test tube reaction is agglutination the end result in the foetal circulation is hæmolysis. The regenerative activity of the foetal blood-forming system floods the circulation with immature red cells (erythroblasts) hence the name erythroblastosis. Ordinarily the first Rh+ child born to an Rh- mother is itself unaffected. A second Rh+ embryo, however, stimulates the further rapid production of antibodies and this and all subsequent Rh+ foetuses will be affected. Of course if an Rh- woman has received a transfusion of Rh+ blood previous to her first pregnancy she will already have been immunized and the first Rh+ foetus she carries can be affected by the antibodies. Some women produce antibodies so slowly that several Rh+ foetuses may be required before one becomes erythroblastotic.'

Using the three antisera eight kinds of people may be distinguished as follows: Rh^o, Rh', Rh'', Rh^o Rh', Rh^o Rh'', and Rh-. The first seven of these eight types are Rh+ for one or more of the Rh antigens; the last one is Rh negative. Using all the Rh factors 87 per cent of American whites are Rh+ and only 13 per cent are Rh-.

One should expect to find erythroblastosis then in 8.32 per cent of all births, that is, about 1 in 12. 'However, the frequency of clinically diagnosed cases has never approached this figure. The recorded incidence is about one-half of 1 per cent; or about 1 in 200 births.'

'The cases of erythroblastosis are not distributed at random among the potential Rh- mothers but usually occur several in the family. It may be, then, that only some women are capable of producing potent antibodies against the Rh antigens. It may also be true that the antigen gets through the placenta only in some Rh- mothers.'

The writer has been investigating the blood of the undifferentiated feeble-minded at the Ohio Institution for the feeble-minded and of their mothers. 'The complete results up to date are as follows: Of 169 mothers of feeble-minded children 38 are Rh-, whereas only 21 or 22 would be expected. This difference is statistically highly significant.' Of 171 feeble-minded

children, 27 are Rh+ from Rh- mothers whereas one should expect only 14. This deviation is also highly significant when tested statistically.

Thus it would seem that in some instances the immune antibodies of the mother produce effects on the brain tissue instead of the usual effects recognized as erythroblastosis. It has been suggested that the immediate effect of red cell destruction is anoxia, and that this lack of oxygen, if it occurs at a time when the brain of the embryo is in a critical stage of development, may very well cause permanent mental deficiency.

Thus the gap between the calculated incidence of effects of Rh immunization and the observed incidence has been partially closed up. At first glance it might appear that the death of erythroblastotic infants is gradually eliminating the Rh factor. Actually it is the other way around, and the Rh factor is being eliminated instead. This is due to the fact that every erythroblastotic infant is heterozygous, Rhrh, so that each death removes equal numbers of the two genes. Since there are far more Rh genes than rh genes in the world, a larger proportion of the rh genes is lost each time.

'The feeble-mindedness due to Rh incompatibility is an acquired mental deficiency, and cannot of course be transmitted to offspring. It could thus account for some of the isolated cases of undifferentiated feeble-mindedness in otherwise highly intelligent families, and also for some of the instances where two feeble-minded parents have produced normal offspring. Perhaps not more than 10 per cent of all undifferentiated mental deficiency can be attributed to Rh incompatibility. It would seem advisable that every girl, on entering into marriage, should learn her Rh type and that of her husband. If she is Rh- and marries an Rh+ man, she should inform her family physician of this fact, so that he may take all available precautions for the preservation of any Rh+ infant she might have. Once in a great while an Rh- mother has an erythroblastotic child. The danger is very small indeed, but the hopes aroused by this discovery are great. In these cases the effect is that of the Hr factor. The Hr factor is reciprocally related to the Rh factor. Corresponding to the three Rh antigens, Rh^o, Rh' and Rh'', three Hr antigens, Hr^o, Hr' and Hr'' are postulated. Two of these, Hr' and Hr'' have been discovered and described; the third will no doubt soon be found.'

'The rare cases of an erythroblastotic child born to an Rh+ mother are cases where the mother is Hr- and the child is Hr+. The Hr- mother and the Hr+ child must both be Rh+, since . . . an Hr- mother cannot be heterozygous for rh. The father may be of any Rh type, since Hr+ individuals occur in all Rh blood types.'

The hopes aroused by this new discovery are that by the use of anti-Hr serums one may be able to pick out, in some instances, at least heterozygous Rh+ men.

Using antigen Hr', there are 10 kinds of Rh types instead of 8. There would thus be 3,200 different types classifiable. Using all three Hr antigens when they become available, there will be 18 Rh types, and thus 5,760 blood types altogether.

Relapsing Fever in an Eight-Day-Old Infant

By W. A. YOUNG, *et al.*

(Abstracted from the *East African Medical Journal*, Vol. 23, November 1946, p. 345)

IN March 1945, an African mother was admitted to hospital as a maternity case. Her clothes were removed and she is said to have bathed before donning hospital clothing and being accommodated in the Maternity Block, the newest part of the hospital. The baby was born the same afternoon, perfectly fit, but on the eighth day became feverish. Examination of its blood revealed heavy infection with *Treponema duttoni*. Repeated examinations of the blood of both mother

and baby were undertaken, always with the same results: Mother negative, child heavy *Treponema duttoni*. Most careful search was instituted for *O. moubata*, and none could be found, nor ever had been found in the hospital, and it was difficult to believe that the Maternity Block could afford harbourage for this tick. Visitors are allowed into the wards daily; the mother had been allowed out of bed for the first time since her admission on the third day after delivery; the child had lain from birth in a wooden cot in a room by itself away from the mother and visitors.

The father was called in and proved to have no *Treponema duttoni* in his blood, but he showed a faintly positive Kahn. He said that neither he nor his wife had had fever, but that they had slept in a tick-infested house on their way to hospital.

Despite immediate institution of treatment, the child died.

Clinical and Pharmacological Aspects of the Toxicity of Streptomycin

By D. G. MADIGAN, *et al.*

(Abstracted from the *Lancet*, i, 4th January, 1947, p. 9)

IN the course of the evaluation of antituberculous chemotherapeutic drugs in this hospital the opportunity to evaluate the status of streptomycin in a side-by-side comparison with established sulphone chemotherapy presented itself in June 1946. A limited supply was available from one source (w.f.) in the form of seventeen batches which had been subject to pharmacological control. The material was available in sterile rubber-capped containers, in the form of a freeze-dried powder and contained the equivalent of 0.2 g. of pure streptomycin base, together with a supply of sterile pyrogen-free distilled water. The biological control of the material before it reached us included tests for sterility and freedom from pyrogens, freedom from histamine-like impurities, and with one exception, from antidiuretic substances. The average lethal doses in an acute experiment for mice of these batches were less than that of pure streptomycin. On the occasion of intrathecal injection an additional toxicity test was made on the batches used for this purpose. However, the figures obtained subsequently proved to be average values for all batches, an isotonic solution being obtained when one container (0.2 g.) was dissolved in 18 ml. of distilled water. In practice one container was mixed with 2 ml. of distilled water, but even with such a hypertonic solution no acute toxic effects were encountered. The usual precautions were taken of withdrawing at least an equal volume of cerebrospinal fluid, the use of a narrow-bore lumbar-puncture needle, very slow injection, and subsequently raising the foot of the bed.

In the course of this trial every attempt was made to evaluate the toxic manifestations of streptomycin both clinically and biochemically. Fourteen patients, aged 2-60 years, served as subjects. The total doses of streptomycin varied from 0.4 g. given in 9 hours to 108 g. given in 90 days. All of the fourteen patients received streptomycin by intermittent intramuscular injection at four-hour intervals; in addition four of the fourteen patients received a daily dose of 0.2 g. intrathecally by the lumbar route, or into the cisterna magna. Preliminary intramuscular injection in one of us (G. B.) proved the streptomycin to be painful; hence at the start of the trial, and subsequently in those patients who complained of pain, streptomycin was administered in the presence of 0.5 per cent procaine hydrochloride. Animal protein enzymic hydrolysate and glucose, of each 1 g. per kg. of body-weight, were given by mouth to all patients on streptomycin to reduce liability to renal and hepatic damage.

Most patients were so seriously ill as to preclude systematic pathological investigations, but in most cases complete blood-counts (including differential leucocyte counts), hæmoglobin estimations, and urine

analysis were done at short intervals before, during, and after the experimental trial. The quantity of streptomycin circulating in the blood at four hours after the intramuscular injection of 0.2 g. of streptomycin was estimated from time to time throughout the trial by the slide technique with a strain of *Bact. coli*, c. n. 1360. Mean blood concentrations of 8 g. per ml. (minimum 4, maximum 16) were found. In cerebrospinal fluid twenty-four hours after intrathecal injection of 0.2 g. (two specimens), the concentration was 3.2 and 6.4 g. per ml.; after intramuscular injection alone no streptomycin could be detected in the cerebrospinal fluid.

No evidence of toxic effects on the hæmatopoietic system was observed and the total and differential blood-counts revealed no fluctuations outside the normal limits. The urines of five subjects showed the presence of leucocytes and epithelial cells during the experimental period; hæmaturias were not seen but red corpuscles were found in two cases. Albuminuria was recorded in one case. Casts were not found on any occasion.

No facial flushing or headache or any other evidence of histamine-like reaction such as described by Hettig and Adcock was seen.

One observation was made which seemed to us to be associated with the toxicity of pure streptomycin. This took the form of an increase of the normal diurnal excursion of the temperature range relative to the pyrexia. It was clearly demonstrated in three of the fourteen cases and showed no obvious relationship to any particular batch. It was not associated with myalgia or arthralgia; nor did any symptom appear with it.

In one case of advanced miliary tuberculosis with peritonitis and meningitis which came to necropsy a diffuse fatty degeneration of the liver was found. This may have been due to the tuberculosis or to the streptomycin. No dermatoses were encountered except a transient erythematous reaction on the dorsum of the hands of a worker ex-prisoner of war. It is doubtful if this condition was due to streptomycin. No toxic effects on the auditory nerve appeared.

On two occasions swelling and pain round the site of injection with regional adenitis developed after intramuscular injection but settled down with conservative treatment in three or four days.

Streptomycin in Experimental Plague

By J. W. HORNIBROOK

(From the *Public Health Reports*, Vol. 61, 12th April, 1946, p. 535. As abstracted in the *International Medical Digest*, Vol. 49, July 1946, p. 38)

THERE has recently been isolated from an organism resembling *Actinomyces griseus* a substance streptomycin which is more active against several organisms than is streptothrycin. Its toxicity is low (LD 0-35 mg.; LD 100-135 mg. per 20 gm. mouse with a preparation containing 30,000 units per gm.). In view of its possibilities as a therapeutic agent in human plague the following tests were made:

'The material used in these experiments contained approximately 200,000 units of streptomycin per gm.'

'The toxicity of this preparation was not properly tested because of a shortage of material. However, one 14 gm. mouse given 20 mg. as a 5 per cent solution intraperitoneally died in 20 minutes while one 15 gm. mouse receiving 10 mg. survived. A 16 gm. mouse given subcutaneously 40 mg. as a 5 per cent solution in distilled water survived.'

'Serial dilutions of the material were made in a liquid medium consisting of tryptose 1.5 per cent, sodium chloride 0.5 per cent and glucose 0.1 per cent. Dilutions were threefold and ran from 1/4,000 to 1/972,000. All tubes were inoculated with a broth culture of *Pasteurella* and incubated 3 days at 37°C. The turbidity was determined by turbidity.'

'In animal experiments mice weighing about 18 gm. were inoculated subcutaneously in the groin with 0.2 c.c. of a suspension of *Past. pestis* in 1 per cent peptone water. The inoculum contained up to 6,000 organisms as determined by plating methods. The streptomycin was inoculated intraperitoneally as a 1 per cent solution at various times and in varying amounts controls were given the same volume of normal saline at the time the test animals received the drug.'

'In two tests treatment was started 3 and 2 days respectively following inoculation with live organisms. Visible swelling at the site of inoculation was considered one of the signs of infection; therefore, at the time treatment was started animals not showing visible swelling in the groin (and those that had died) were excluded from the experiment. The remainder were treated. Sulfadiazine was also used for purposes of comparison.'

'At the end of 14 days from the time of inoculation all surviving animals were killed autopsied and the spleens cultured (circumstances prevented spleen culture in the last experiment). Animals dying during test were autopsied but spleen cultures were not made as decomposition made the isolation of pure cultures difficult. Spleen smears were made on all animals in which the post-mortem appearance was not typically that of plague in all its details. When typical bipolar organisms were found the spleen smears were considered positive. In diagnosing plague by post-mortem appearance the following signs were looked for: local lesions; enlarged lymph nodes; infected skin; soft, dark, enlarged spleen; lesions in the liver, lungs, and spleen. Spleen cultures were made by rubbing the cut surface of the spleen on the surface of a tryptose-glucose agar plate. A number of the positive cultures were checked by transfer of the typical colonies to tubes where fermentation of the various sugars was checked.'

'Streptomycin (both unheated and heated) inhibits the growth of *Past. pestis* in broth.'

'To test the prophylactic action of the drug mice were inoculated with plague subcutaneously, and varying amounts of streptomycin given intraperitoneally $\frac{1}{2}$ hour before and 17 and 24 hours after challenge. It seemed justifiable to consider mice dead 14 days following plague inoculation to have died from plague. However, autopsies were done with the following results: All of the animals which died showed evidence of plague on the basis of either gross pathology or spleen smears or both. Two of the four controls killed at the end of 14 days had local lesions and one had a bubo on the side opposite to the site of injection. One of the mice receiving dosage of 1 mg. and one receiving 0.5 mg. had enlarged inguinal nodes. The remainder were essentially normal. Spleens of all of the mice killed were negative on culture.'

'The above test was repeated, but the drug was given $\frac{1}{2}$ hour before and 24 hours after infection (making two instead of three doses). In addition, in one group treatment was not started until 2 days following infection. Results found at autopsy were as follows: All animals which died showed evidence of plague on the basis of either gross pathology or spleen smears or both. Surviving animals were killed on the fourteenth day. Three of the controls showed enlarged inguinal glands. One mouse receiving 1 mg. and one receiving 0.5 mg. had local lesions. One mouse given 0.5 mg. had both local and splenic lesions. One mouse given delayed treatment had local lesions. Spleen cultures of one mouse receiving 2 mg. and one receiving 0.5 mg. were positive for plague. All other spleen cultures from killed mice were negative.'

'In order to determine the effectiveness of streptomycin after the infection had developed 30 mice were challenged with live organisms. At 72 hours, 2 were dead and 3 showed no swelling at the site of inoculation; these were discarded. The remainder were treated. Two doses were given with a 24-hour interval between. All animals that died showed evidence of plague on the basis of gross pathology or spleen smears or both. All surviving animals killed on the fourteenth day

had enlarged nodes and one had a local lesion; the cultures from the spleens were negative.'

'The test appeared a bit drastic as several of the mice had died before treatment had started. In the following test treatment was started 48 hours after infection and a dose given daily for 6 days. In addition, a control was run with sodium sulfadiazine in the same dosage except for the first dose which was 5 mg. rather than 2 mg. Thirty-six mice were given live organisms and 48 hours later six were discarded as they showed no inguinal swelling. The remainder were treated. All mice which died showed evidence of plague on the basis of gross pathology or spleen smears or both. All mice killed on the fourteenth day showed swollen inguinal glands. Spleen smears were negative except for one streptomycin-treated mouse which showed an occasional organism.'

Traumatic Pulmonary Oedema Treated with Concentrated Plasma

By G. CLELAND

(Abstracted from the *Lancet*, ii, 9th November, 1946, p. 667)

PULMONARY oedema due to trauma carries a grave prognosis. Its causes include blast, petrol explosions, chest wounds, fat-embolism, accidental inhalation of noxious gases in industry and accidental overtransfusion with either blood or saline. Except in overtransfusion, accepted methods of treatment are not very successful.

Pulmonary oedema is characterized by severe respiratory distress and pronounced cyanosis. Large quantities of frothy mucus are thrown up into the trachea and well up through the larynx. Auscultation of chest detects coarse crepitations throughout which sound very close to the stethoscope. Danger to life lies in drowning through vast quantities of mucus in the alveoli and bronchial tree.

RATIONALE

The writer observed on many occasions that concentrated plasma administered intravenously reduces oedema in second-degree burns, apparently by its direct action in raising the osmotic pressure in the capillaries. If this can be done in traumatic oedema in other parts of the body, it should be possible in pulmonary oedema due to trauma, though not in pulmonary oedema produced by circulatory failure as a terminal event or due to overtransfusion.

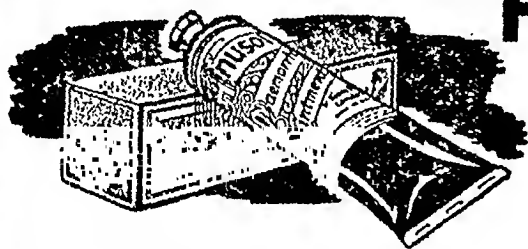
METHOD

Many of the recognized methods of treatment for pulmonary oedema of traumatic origin are used, and concentrated plasma intravenously administered, is an addition to them, not a replacement of them.

Atropine gr. 1/50 is administered intravenously to diminish bronchial secretion to a minimum as soon as possible. It is considered that the atropine can have no direct bearing on the pulmonary condition.

So that maximal oxygenation may take place, as much of the mucus in the bronchial tree as possible must be removed. If the condition has only recently developed and consciousness has not been lost, the patient is encouraged to cough up as much of the mucus as possible. If the patient is either comatose or semi-comatose, the patient is laid supine, and the foot of the bed raised to encourage the mucus to flow towards the larynx. A tube is passed, under direct vision, into the trachea, and the mucus is sucked out. The injection of 'Coramine' 3-5 c.c.m. intravenously at this stage will often produce a temporary return of the cough reflex. This will bring still more of the mucus into the scope of the suction tube.

Oxygen is given continuously by a method which ensures the maximal concentration of that gas in the nasopharynx. The administration of concentrated plasma intravenously is begun coincidentally. In the



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above-mentioned measures originally, double-strength plasma was used (the dried equivalent of 800 c.cm. of human plasma dissolved in 400 c.cm. of sterile water), latterly, triple-strength plasma has been used. The plasma is administered at a rate of about 80 drops a minute, and little difficulty is experienced in maintaining the flow if slight pressure is used. A dose of 400 c.cm. is usually adequate, but occasionally up to 800 c.cm. is required.

Other fluid intake should be limited.

Should it be proposed to use the method in accelerating recovery from pulmonary oedema as a result of overtransfusion, an adequate venesection is a necessary preliminary to the infusion of the concentrated plasma.

ILLUSTRATIVE CASE RECORDS

The five illustrative cases of pulmonary oedema due to various kinds of trauma showing the wide application of the method are described.

COMMENT

It appears clear that the initial improvement in these cases can be attributed to the standard measures applied. The outstanding advantage which appears to result from the use of concentrated plasma is the tendency for progressive improvement and the remarkable absence of any tendency for the condition to recur. No case has required more than one clearing of the trachea by suction.

DANGERS OF CONCENTRATED PLASMA

Reactions of various degrees of intensity may arise, but these do not differ from the reactions which may arise when normal plasma is used to replace plasma loss. Reactions only appear to be really dangerous when a serious hyperpyrexia develops. By careful observation this may be anticipated and the infusion stopped. If, on the other hand, it appears that death is a certainty from the pulmonary oedema unless administration of the plasma is continued, a fresh amount of plasma may be given through a fresh giving set and the pyrexia controlled by the usual cooling measures.

The Eye Bank

(Abstracted from the *Journal of American Medical Association*, 7th December, 1946, p. S62)

THE Eye Bank for Sight Restoration, Inc., established in 1944 in New York City, was conceived as a centralized agency where eyes could be systematically salvaged, preserved and redistributed to doctors who perform the corneal grafting operation. From twenty leading ophthalmologists originally to over two hundred and thirty-seven doctors at present are serving throughout the nation. Fifty-six hospitals participate in the project. Transportation has been made available through the co-operation of the American Red Cross and various airlines. In addition to supplying corneas for surgical procedures, the eye bank has carried on a widespread programme of education both of the public and of physicians through the press, magazines, the radio and the distribution of literature. During the first year of activity nine scholarships were awarded, two fellowships have been granted. The facilities of the Ayer Laboratory for Corneal Research have been made available for routine and investigative work. Here the eyes are received, given a prompt and careful examination to determine the condition of the corneal tissue, put under a twenty-four hour culture test and then sent with directions to doctors for grafting operations. Research problems include studies on corneal preservation, techniques of transplanting the vitreous humour and investigations of the metabolic and histologic properties of the eye. An information kit of educational material may be obtained by writing to the Eye Bank for Sight Restoration, Inc., 210, East 64th Street, New York 21.

A. B. R. C.

Medicolegal

LEUKÆMIA AND WAR SERVICE

(Abstracted from the *British Medical Journal*, 21st. December, 1946, p. 970)

A DRIVER in the Royal Army Service Corps was posted to Belsen Camp soon after it was discovered. He stayed there for a few days, and seven days later, he fell ill with an acute type of leukemia. He was flown to England but died in about four weeks. His widow claimed a pension. Before 1944, she would have had to prove that the death had been attributable to war service, but by the Royal Warrant, which came into force at the end of 1943, claimants are in a much stronger position, for the Minister must now prove that the prescribed conditions have not been fulfilled, i.e. that the death must have been due to or hastened by a wound, injury, or disease attributable to war service, or the aggravation by war service of a pre-existing trouble. The claimant is given the benefit of all reasonable doubt. Moreover, as leukemia was not noted in any medical report on the driver at the beginning of his service, the widow had a presumption in her favour that it was attributable to his service. The Minister and the Pensions Appeal Tribunal both found against her and she took the case to the High Court.

The Medical Services Division of the Ministry had stated that leukemia was a condition in which there was an overgrowth of the white cells of the blood; there was no evidence that the disease was caused by any known organism; the changes which occurred were generally regarded as neoplastic, affecting the white-blood-cell-forming tissues; and the disease ran a characteristic course which in the acute type was rapidly fatal. This, said the judge Mr. Justice Denning, told the court nothing about the cause. The Division concluded that leukemia was not a condition of which the onset or progress could be regarded as affected by conditions of service, including those which the widow alleged. If, said the judge, the earlier part of this opinion had contained material sufficient to warrant such a conclusion, he would have been unable to interfere with that evidence, but he found nothing to do so in any way. Considering that the disease had shown itself after the man had stayed in Belsen Camp, and in view of the strong presumption created by the absence of any mention of it in an initial medical report, the medical evidence against the claim must be particularly cogent in order to defeat it, and must establish clearly that all external causes could be excluded. This it had not done. He therefore reversed the finding of the tribunal and granted the pension.

A. B. R. C.

Reviews

MEDICAL ELECTRICITY FOR MASSAGE STUDENTS.

—By Hugh Morris, M.D., D.M.R.E. Third Edition. 1946. J. and A. Churchill Limited, London. Pp. viii plus 348, with 114 illustrations. Price, 2s.

THE third edition of Dr. Morris' book will be welcomed by students taking courses in massage and physiotherapy.

The first twelve chapters contain a concise and lucidly written account of the underlying principles of electricity. Chapters 13 to 20 deal very adequately with the use of galvanic and faradic currents. The section on muscle testing is particularly well done.

Latter chapters deal with diathermy, including an adequate account of short-wave therapy.

The final sections of the book deal with ultra-violet and infra-red radiation. A useful section at the end deals with individual diseases and their treatment by electro-therapeutic methods.

The book is quite one of the best that has appeared on the subject. It is written in very simple language, and will be much appreciated by physiotherapists.

G. G.

PROCEEDINGS OF THE ALL-INDIA OPHTHALMOLOGICAL SOCIETY. Volume VIII. Session 1945. Printed at the Madras Publishing House, 19, Mount Road, Madras. Pp. xx plus 176. Illustrated

THIS is the report of the more important papers and discussions sent to, or delivered at, the meeting of the All-India Ophthalmological Society, held in Hyderabad, Deccan, in March 1945. The main section deals with a Symposium on Glaucoma. Among the more interesting of the other papers are: 'A Type of Conjunctival Affection associated with Staphylococcus Citreus', by B. N. Bhaduri; 'Detachment of the Retina with Involvement of the Macula'—Report of Two Cases, by K. Sen; 'Local Use of Sulfapyridine Powder in Eye Affections', by C. N. Shroff; and 'Sub-Conjunctival Sulphonamide Therapy in Ocular Infections', by H. D. Dastoor.

E. J. S.

AN INTRODUCTION TO BIOCHEMISTRY.—By W. R. Fearon, M.A., Sc.D., M.B. Third Edition. 1946. William Heinemann (Medical Books) Limited, London. Pp. x plus 569. Price, 21s. net

It delights us to handle the new edition of Fearon's Introduction to Biochemistry, the predecessor of which we had the pleasure of reviewing several years ago.

One of the first things which strike the reviewer is that in the present edition the author has revised the book in a very thorough manner and has brought before the students the recent advances in some of the important and interesting subjects, like food absorption, acid-base balance, carbon-dioxide transport, amino acids, blood chemistry, etc. Chapter 14, dealing with Nutrients, has almost completely been rewritten and its sub-section on vitamins and pro-vitamins has been brought up on the lines of our up-to-date knowledge on the subject. A new chapter on Tissue Chemistry has been added.

The book appears to us to be admirably suitable for students going up for higher studies on the subject. It has been written in an excellent style and the author has comprehensively dealt with the fundamental processes going on in the human body, avoiding lengthy discussions on debated points which are often confusing to the student.

As an admirable summary of the recent advances in biochemistry, the book would be helpful not only to medical students but also to all who want to be introduced to the subject of modern biochemistry.

J. P. B.

TEXTBOOK OF MIDWIFERY.—By W. Shaw, M.A., M.D. (Cantab.), F.R.C.S. (Eng.), F.R.C.O.G. Second Edition. 1947. J. and A. Churchill Limited, London. Pp. xiv plus 649, with 4 plates and 235 text-figures. Price, 21s.

THIS is another excellent publication by Messrs. J. and A. Churchill Limited, London. Mr. Shaw's productions have a special feature of their own. They are written from the personal experience of a veteran professor working in an institution hoary with the best traditions of scientific medicine.

Recent works on such important subjects like 'Erythroblastosis Foetalis'—Penicillin Therapy, etc., have been incorporated for the benefit of students going up for examinations. At the same time the usual paraphernalia of a textbook of obstetrics, viz, the description of the mechanism of labour, discussion on the

toxæmias of pregnancy, prevention and treatment of puerperal infections have also found their places.

In the preface, the author says, 'I have also endeavoured to point out the different and often conflicting opinions which are held in various forms of treatment'. His endeavour will be well appreciated not only by those for whom the book is meant but also by others who try to follow his times in their routine work of teaching.

It is difficult to single out any chapter for special praise. For brevity of description without sacrificing the completeness of details, the section on Analgesia and Anaesthesia during child birth may be mentioned. This is perhaps the first textbook written in English to write about the use of 'Pethidin', a very recent acquisition in the obstetrician's armamentarium.

A new nomenclature 'Pathology of Pregnancy' has been used. The toxæmias of pregnancy should be included under this head, though they have been dealt with in a separate chapter.

It is difficult to overpraise this book. In the chapter on Operative Midwifery 'Forceps Application' has been elaborately dealt with. This is what it should be. Destructive Operations on the Fœtus have been dealt with rather sparingly. Better and detailed description of the management of such operations will be appreciated by those of us who may have to tackle cases where there have been no antenatal care and improper conduction of the early stages of labour.

The get-up and printing of the book is in the best way of Messrs. Churchills' publications.

M. S.

DISEASES OF THE SKIN.—By James H. Sequiera, John T. Ingram, and Reginald T. Brain. Fifth Edition. 1947. J. and A. Churchill Limited, London. Pp. xii plus 782, with 63 coloured plates and 380 text-figures. Price, 63s.

MEDICAL men interested in diseases of the skin have grown grey while waiting for a new edition of this famous book. It has appeared at last, after 20 years! In this time two of the original authors' students have become his colleagues and collaborators.

The old ground has been covered as thoroughly as ever before and with the same mastery in summing up controversies and the same boldness in giving the verdict. The information on newer fields, however, cannot be said to be as complete. For instance, Reiter's syndrome and Beheet's syndrome are not in the index; the newly described infective agent of Granuloma Venereum has not replaced the inclusion body; malaria therapy of Pemphigus has not been given; and lesions of the tongue in Hodgkin's disease have not been mentioned.

The first 31 pages dealing with Introduction, Histology and Physiology of Normal Skin, and Morphology of Skin Diseases condense admirably the basic facts which although well known in pre-clinical days grow hazy steadily, with the passage of time, in a busy medical man's life. The last 17 pages give an equally admirably condensed account of physiotherapy.

The tropical diseases of the skin continue to be well represented. This fact makes the book particularly useful to medical men in India.

The 380 black-and-white illustrations and 63 coloured plates are excellent.

The book remains a standard English work on dermatology and can be recommended confidently to anyone requiring information on the subject.

S. D. S. G.

HERMAPHRODITOS: THE HUMAN INTERSEX.—By A. P. Cawadlas. Second Edition, Revised and Enlarged. William Heinemann (Medical Books) Limited, London. Pp. x plus 81. Illustrated. Price, 15s.

THE theme of this book is that feminized men and masculinized women are often seen but hermaphrodites hardly ever; that in fact all human beings are intersexual possessing both gonads, one developed and the

other rudimentary; that all men secrete the female hormone, oestrin; and that only imbalances of intersexuality constitute a morbid state. The theme is stated after a composite atmosphere of classics, history and biology has been created.

We are told that the libido, at its appearance slightly before puberty, is bisexual. There are, therefore, such considerations to engage one's attention as the Balance Sheet of Sexual Characters, the Genetic Sex and the Pragmatic Sex.

Accidental hormonal imbalance has been considered. Cirrhosis of the liver may cause gynecomastia as the oestrin secreted by the male is destroyed by that organ (p. 50): the undestroyed hormone builds up a female breast.

The institution of homosexuality amongst the ancient Greeks has merely been mentioned. In view of the recent comment on this human failing, in the British and American current medical literature, more was expected in a book with such a title. The statue of this name, frank in conception and perfect in execution, is essentially an embodiment of the Greek sentiment.

Examples of male and female inter-sexual biotypes with imbalance have been given from old records.

Therapeutics of imbalance include hormone, vitamins, suggestion and surgery.

The book which is in its second edition is an expansion of the author's Thomas Vicary Lecture on Hermaphroditism.

S. D. S. G.

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES NO. 254. AN EXPERIMENTAL STUDY OF RATIONING.—By R. A. McCance and E. M. Widdowson. 1946. Published by His Majesty's Stationery Office, London. Pp. 61. Price, 1s.

THIS is the account of an interesting experiment which was carried out by the authors at the outbreak of war in September 1939 to discover whether English men and women could live and thrive mentally and physically if they were subjected to a feeding regime in which fat, sugar, flesh foods and other rationed articles of diet were severely restricted. The experimental diets were planned to meet much more serious blockade conditions than were actually experienced in the war. The calories were not limited, and they had enough proteins, though low in essential proteins, large amounts of carbohydrate and sufficient minerals, but had very little fat in them. It was found that the subjects of the experiment, who were all young people, required a little time to adapt themselves to the changed conditions. This they did by increasing their consumption of unrationed foods which were essentially potatoes, green and root vegetables, bread of 92 per cent extraction and fortified with calcium carbonate. The majority of the subjects made satisfactory adjustments, and once they had done so they were content. Their health remained good during three months' period of the experiment at the end of which they were able to take prolonged and severe physical exercise without undue fatigue.

The report is a valuable contribution to our basic knowledge of nutrition and should be widely read. It shows how in times of stress and qualitative restriction of food a diet can remain compatible with good health, so long as it conforms to certain well-defined nutritional principles.

R. N. C.

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES NO. 255. 'CHEMOTHERAPEUTIC AND OTHER STUDIES OF TYPHUS.'—By M. Van Den Ende et al. 1946. Published by His Majesty's Stationery Office, London. Pp. 246. Illustrated. Price, 12s. 6d.

THIS report records the result of clinical and laboratory studies of typhus fever, carried out in relation to investigation on the chemotherapy of the disease. Out of some 238 drugs (listed in Appendix B)

which have been tested against experimental infection in mice two compounds designated V147 and V186 were selected for special investigation as these were found to be very promising in laboratory animals. They belong to sulphonamide group of drugs but differ from them in some respects. Section I describes studies of the toxicity of these two drugs. The account of an expedition to North Africa and Italy forms the largest part of the report (section II) and it was in these two areas that clinical trials were carried out during the war by a British Army Typhus Research Team with the co-operation of various authorities. Though, unfortunately, the drugs did not prove effective, an admirable opportunity was obtained for making detailed clinical and pathological observations which are recorded in the report, giving a picture of louse-borne typhus as seen in North Africa and Naples. The case reports of typical typhus patients are given in Appendix A to this monograph. The last three sections describe a number of important studies on the immunology of typhus fever which were made at the National Institute for Medical Research and the R.A.M.C. Emergency Vaccine Laboratory.

This is a valuable monograph on typhus.

R. N. C.

BULLETIN OF THE HEALTH ORGANIZATION. Volume XI, 1945. Published by the Health Organization, League of Nations, Geneva. Pp. 235. Price, 6s. or \$1.50

THIS is a complete bibliography covering not merely the period during which the Bulletin has appeared but the whole of 25 years of existence of the Health Organization. It will serve as a record of the work of the Organization and as a tribute to the many collaborators all over the world as well as a guide to technical studies on varied subjects carried out under the auspices of the Health Organization of the League of Nations.

R. N. C.

THE TREATMENT OF BRONCHIAL ASTHMA.—By Vincent J. Derbes, M.D., and Hugo T. Engelhardt, M.D., F.A.C.P. With chapters by a panel of contributors. 1946. J. B. Lippincott Company, Philadelphia and London. Pp. xv plus 466, with 61 illustrations. Price, 48s.

THAT it should be necessary to get 19 contributors to write a book on bronchial asthma covering about 450 pages shows the enormous importance which the disease has attained. As it appears from the historical introduction, asthma was recognized by the ancient Greek physicians as a distinct clinical entity, and it is interesting to know that Jerome Carden in 1552 cured the Archbishop of St. Andrews of asthma by insisting on, among other things, avoidance of feather beds—a forecast of allergy, and that three centuries ago Thomas Willis described bronchial spasm as one of the causes of asthmatic attacks. The book is divided into two parts. The first has eight chapters devoted to basic fundamentals, viz. ætiological factors, anatomy and physiology of the respiratory tract, pathology, immunology, climate and weather effects, etc., while the fifteen chapters of the second part deal with clinical aspects, diagnosis and treatment. There is hardly any aspect of the disease which has been left untouched by the authors, and all our knowledge on the subject has been assembled and presented from the general practitioner's point of view. The book can certainly be recommended to all interested in the field.

R. N. C.

FORENSIC CHEMISTRY.—By Henry T. F. Rhodes. (Second Edition, Revised.) Chapman and Hall Ltd., 37 Essex Street, W.C.2, London. Pp. 164. Price, 15s.

THIS is the second edition of a little book in Forensic Chemistry in English by a worker in France. It is much more than toxicology which is usually associated with forensic medicine.

Certain suggestions for the next edition offered in the review of the last edition (1940) can be repeated: (1) Removal of certain obscurities (page 11, para 2; page 70, last para; page 81, para 6; page 154, para 3) and unnecessary restrictions (page 155, para 4, not keeping sulphuric acid in glass bottles). (2) Differentiation between blood groups and blood types. (3) Clarification of descriptions by re-arranging types of headings. A sub-heading in *capital* letters should not fall under a heading in *small* letters as occurs on p. 112, under (g). The Examination of the Forged Documents, on page 106 falls 'The Date of the Document' on page 112. (4) Inclusion of sweat analysis undertaken for turf clubs. Samples used to be sent to France from all over the world in suspected drugging of horses.

The number of pages in this edition has been reduced by 50, by reducing the margin. The text now appears rather overcrowded and therefore overwhelming.

A useful addition to the library of forensic literature.

S. D. S. G.

ESSENTIALS OF ALLERGY.—By Leo H. Crlep, M.D. J. B. Lippincott Co., Philadelphia, London and Montreal. Pp. 381. Price, 30s.

THIS little book provides an ideal introduction to the intriguing subject of Allergy. This condition is responsible for about 10 per cent of cases in a physician's practice in America and there is no reason to suppose that the percentage is less in India.

The simple procedures of testing and treating the allergic states are given in detail and case reports provided. The account avoids scrupulously the metaphysics of immunology which even a man of leisure finds dull and which is never likely to interest busy practitioners. The bibliography for the interested readers is not wanting.

The recipes for special diets are so good that the latter are not likely to be suspected as special. Here and there the cookery book language might have been paraphrased (e.g. '2 eggs separated', 'Beat egg white until stiff and dry', 'Fold white into egg yolk mixtures', page 131).

The get-up is excellent. The price could be lower.

S. D. S. G.

BOOKS RECEIVED

1. Nutrition. Bulletin No. 28. April 1947. Published by the Department of Food, Government of India, New Delhi. Pp. 32. Illustrated.

2. Health Horizon. April 1947. A Magazine for Everyone. Published quarterly by Health Horizon, Tavistock House, Tavistock Square, London, W.C.1. England. Subscription for four issues:—5 shillings.

Abstracts from Reports

ANNUAL REPORT OF THE PENDRA ROAD SANATORIUM, PENDRA ROAD, BILASPUR DISTRICT, CENTRAL PROVINCES, FOR THE YEAR, 1945-46

The sanatorium is two and a half miles from Pendra Road Railway Station of the Bengal Nagpur Railway. It offers treatment to consumptive patients on modern scientific basis. The number of beds available in 1916 when it was opened was 12. At present, it has accommodation for 160 patients, 66 are in separate cottages and 94 in 5 general wards. Of the latter, 49 are free beds reserved by the Central Provinces Government, various donors and associations.

The number of patients admitted during the year was 195. The daily average number of patients treated

has been 160. 58.7 per cent of the patients on admission were advanced cases of tuberculosis. Out of 207 patients discharged, 162 patients were found to be suffering from pulmonary tuberculosis. 120 or 74.1 per cent were discharged with positive results, viz, 26 as 'arrested', 78 as 'much improved' and 16 as 'improved'. Among the patients discharged with negative results, 13 were discharged as 'stationary', 14 as 'worse' and 15 as 'dead'.

There is an after-care colony for poor ex-patients of the sanatorium. It is now only in its infant stage but with financial support it is hoped to extend its usefulness.

R. N. C.

A REPORT OF THE SEVENTY-SECOND YEAR'S WORK IN INDIA AND BURMA OF THE MISSION TO LEPROS FOR THE YEAR SEPTEMBER 1945 TO AUGUST 1946

THE Mission has many Homes and aided Houses all over India, in which the total number of leper inmates, at the end of December 1945, was 9,221 excluding 854 healthy children. In addition, well over 11,000 out-patients received treatment. The report is illustrated with photographs and gives some details which show the fine work that is being done in the various Homes. The Mission has also leprosy homes and hospitals in Burma and Ceylon and supports work for sufferers from leprosy in China, several countries in Africa and in other lands. The expenditure for all purposes in 1945 was approximately Rs. 16,22,046.

R. N. C.

Correspondence

INADEQUACY OF MEDICAL EDUCATION IN INDIA

SIR,—On graduation one finds that when confronted with first few cases all that was taught and emphasized in medical colleges is hardly sufficient and necessary for equipping one for general practice. In fact, the knowledge that is being imparted these days in the medical institutions makes it necessary for every fresh graduate to put in quite some time to acquaint himself with the requirements of general practice. This is not only my view: it is shared by graduates from Agra, Lucknow and other places as well.

Things being so, I might suggest a few points for the consideration of those who are now actively planning to improve the medical education.—

(1) That in every subject half of the examiners should be general practitioners. This is worth considering because the highly qualified staff in the colleges while teaching their subjects always try to (may be unconsciously) make out of their pupils specialists, which is unfair. Most of these highly qualified teachers are appointed examiners and to put below a few of the questions asked by them will not be out of place here:—

1. Retinitis pigmentosa in ophthalmology.
2. Types of joints in sewage pipes and their construction in hygiene.
3. Pneumonic plague and its treatment in medicine.
4. Arsenical dermatitis in medicine.

The appointment of general practitioners, as half the number of examiners will serve as a deterrent to the specialists doing injustice to the students in the degree examinations.

(2) In order to prevent further and avoidable wastage of man-hours, a series of lectures in every subject and practical demonstrations by general practitioners should be instituted in colleges so that the graduates may have some ideas of the rôle he is to

play as a general practitioner and the problems he has to confront after graduation.

(3) The suggestion of imparting instructions in a practical manner about general nursing should also carefully be considered.

Yours, etc.,

H. C. JAIN, M.B., B.S.

CHANDAN NIWAS,
AJMER,
26th March, 1947.

[Note.—Probably by every subject the writer means every clinical subject. The general practitioners are and will remain the back-bone of the profession. To force them, however, to examine in non-clinical subjects will not be fair.—EDITOR, I.M.G.]

Any Questions

POTENCY OF PENICILLIN

SIR,—I am to say that penicillin sodium is usually found in the form of dry powder or lumps. But in some phials it is found as a firm cake adherent to the bottle. As it is said to be very hygroscopic, and from the appearance of the cake it appears that it has absorbed some moisture and has been turned into a firm and adherent cake, it may be considered to have lost its efficacy. I request you to kindly let me know precisely the therapeutic value of such a stuff.

Yours, etc.,

BALWANT SINGH BAJWAH, L.S.M.F.

CIVIL HOSPITAL,
TEHRAN (U. P.).

[Commercial penicillin vials contain penicillin in a 'lyophilized' state, which means that the watery portion has been removed from the antibiotic filtrate by a special process involving drying under a state of refrigeration. This method leaves the material sometimes in the form of a shell adhering to the glass sides of a vial or a foam with minute pores on the surface. This is therefore no indication that the material has lost potency or absorbed moisture. Provided the seal of the vial is intact and the material inside is freely soluble in distilled water or saline, it can be safely used in therapeutics.—B. M.]

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL M. K. AFRI, C.B.E., Deputy Director, Malaria Institute of India, Delhi, is appointed to officiate as Director of the Institute, with effect from the 1st March, 1947, *vice* Major-General Sir Gordon Covell on leave.

Lieutenant-Colonel C. Mani, on return from deputation to Europe and Egypt, assumed charge of the post of Additional Deputy Public Health Commissioner with the Government of India on the forenoon of the 1st May, 1947.

Lieutenant-Colonel A. S. Garewal, Inspector-General of Prisons, Central Provinces and Berar, is appointed to hold the charge of the current duties of the office of the Inspector-General of Civil Hospitals, C.P. and Berar, in addition to his own duties with effect from 12th May, 1947.

Major J. N. Ghosh, M.C., has been appointed as Medical Adviser (Pensions) (D.A.D.M.S.), Defence Department (Pensions Branch). Dated 20th November, 1946.

Major T. Somerville is appointed to officiate as Assistant Director, Central Research Institute, Kasauli, with effect from the 1st January, 1947, *vice* Lieutenant-Colonel W. J. Webster, C.B.E., M.C., granted leave pending retirement.

Major P. V. Krishnamurti is appointed Medical Adviser (Pensions) D.A.D.M.S., Defence Department (Pensions Branch). Dated 31st March, 1947.

Major G. H. K. Niazi, Deputy Assistant Director-General (Medical Stores), Medical Store Depot, Raipur, is transferred as Deputy Assistant Director-General (Medical Stores), Medical Store Depot, Bombay, with effect from the afternoon of 2nd April, 1947.

Major R. B. Sule, M.C., is appointed as Medical Adviser (Pensions) (D.A.D.M.S.), Defence Department (Pensions Branch). Dated 5th April, 1947.

The undermentioned officers of the I.M.S. (E.C.), revert from the I.A.M.C. and are seconded for service in the Royal Indian Air Force :—

Captain D. M. Marker. Dated 23rd December, 1946.

Captain P. R. Kutty. Dated 31st December, 1946.

Captain (A./Major) H. K. Khalil. Dated 7th January, 1947.

Captain P. R. Govind. Dated 7th January, 1947.

Captain P. Dharmaraju. Dated 8th January, 1947.

Captain Z. Khan. Dated 3rd February, 1947.

Captain S. B. H. Gardezi. Dated 7th February, 1947.

8th February, 1947

Captain M. A. Khan. Captain R. Arunchalam.

LEAVE

Major-General Sir Gordon Covell, C.B.E., K.H.F., Director, Malaria Institute of India, Delhi, is granted leave *ex-India* from the 1st March, 1947 to the 19th October, 1947, preparatory to retirement.

Lieutenant-Colonel H. W. Mulligan, Director, Central Research Institute, Kasauli, is granted combined leave *ex-India* for 12 months, with effect from the 14th April, 1947.

PROMOTIONS

Lieutenant-Colonel to be Colonel

A. V. Lopes. Dated 7th October, 1946.

Majors to be Lieutenant-Colonels

S. T. Davies. Dated 15th February, 1947.

H. W. Farrell, O.B.E. Dated 28th February, 1947.

B. D. Khurana. Dated 28th April, 1947.

Captains to be Majors

1st March, 1947

M. D. Black.

I. D. Sutherland.

G. J. H. Maud.

R. Passmore. Dated 2nd March, 1947.

T. P. Binns. Dated 26th March, 1947.

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captains to be Majors

A. K. Choudhri. Dated 2nd April, 1947.

6th April, 1947

B. R. Irani.

T. J. Gupta.

M. S. Dutta.

INDIAN MEDICAL SERVICE SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

(WOMEN'S BRANCH)

Captain to be Major

D. M. J. Stracey. Dated 17th April, 1947.

Lieutenant to be Captain

M. R. Ratra. Dated 13th February, 1946.

RETIREMENTS

Major-General H. J. M. Cursetjee, K.C.I.E., C.S.I., D.S.O. Dated 1st June, 1946.

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

Major M. G. Leane, retires on account of ill health, dated 13th August, 1946, and is granted the honorary rank of Lieutenant-Colonel.

Lieutenant-Colonel Hari Das. Dated 15th January, 1947.

Lieutenant-Colonel G. V. Ram Mohan. Dated 22nd February, 1947.

Colonel R. N. Khosla, O.B.E., K.H.S. Dated 12th April, 1947.

RELINQUISHMENTS

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Lieutenant-Colonel. His services are replaced at the disposal of the Government of Bengal with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Lieutenant-Colonel Nripendra Chandra Chatterjee. Dated 2nd April, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Lieutenant-Colonel. His services are replaced at the disposal of the Government of Punjab from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Lieutenant-Colonel M. A. Sami. Dated 24th April, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Lieutenant-Colonel. His services are replaced at the disposal of the Government of Madras with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Lieutenant-Colonel H. C. Halge. Dated 25th November, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Lieutenant-Colonel :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Ty. Lieutenant-Colonel R. S. Tata. Dated 4th August, 1946.

Ty. Lieutenant-Colonel N. S. Variava. Dated 21st October, 1946.

Ty. Lieutenant-Colonel M. C. Menon. Dated 26th November, 1946.

Ty. Lieutenant-Colonel H. B. T. Holland. Dated 30th November, 1946.

Ty. Lieutenant-Colonel C. L. Kashyap. Dated 18th December, 1946.

Ty. Lieutenant-Colonel A. G. David. Dated 26th December, 1946.

Ty. Lieutenant-Colonel Khawaja Abdur Rashid. Dated 15th February, 1947.

Ty. Lieutenant-Colonel R. K. Chakravarty. Dated 23rd February, 1947.

Ty. Lieutenant-Colonel C. L. Bhola. Dated 14th March, 1947.

Ty. Lieutenant-Colonel P. B. Bose. Dated 25th March, 1947.

Ty. Lieutenant-Colonel Anjur Subramania Ramachandran. Dated 6th April, 1947.

(WOMEN'S BRANCH)

Ty. Lieutenant-Colonel (Miss) Perin Mullaferoze. Dated 21st February, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are placed at the disposal of the Punjab Government from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain Mohan Lal Sur. Dated 19th April, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are replaced at the disposal of the Government of Bengal with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Major K. Sen. Dated 1st May, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are replaced at the disposal of the Government of U.P. from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Major Gobind Lal Dutt. Dated 6th May, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major. Their services are placed at the disposal of the Government of Punjab with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain Ishar Dyal Singh. Dated 27th June, 1946.

Ty. Major Nirmal Prakash. Dated 13th July, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major. Their services are replaced at the disposal of the Government of Bombay from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Ty. Major Manibhai Dahvabhai Desai. Dated 1st August, 1946.

Ty. Major Govind Anant Bhagwat. Dated 1st October, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are placed at the disposal of the Government of India, in the Department of Health, with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Major Mirza Zafar Yab Hussain. Dated 22nd August, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are replaced at the disposal of the Chief Commissioner, Coorg, with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Major C. B. Kariapa. Dated 7th November, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Ty. Major Raymon Vivian Norman Nayudu. Dated 18th January, 1946.

Ty. Major E. G. Sastry. Dated 7th April, 1946.

Ty. Major G. P. Rayen. Dated 21st April, 1946.

Ty. Major S. S. A. Khan. Dated 13th June, 1946.

Major K. B. Chowdhury. Dated 26th August, 1946.

Ty. Major D. S. Khatri. Dated 2nd September, 1946.

Captain G. A. Aleem. Dated 27th September, 1946.

Major K. B. Taneja. Dated 7th October, 1946.

Major G. S. Sandhu. Dated 17th October, 1946.

Ty. Major P. N. Banerjee. Dated 17th October, 1946.

Ty. Major H. S. A. Malik. Dated 18th October, 1946.

Major M. S. Hashemi. Dated 20th October, 1946.

Ty. Major B. N. Chatterjee. Dated 26th October, 1946.

Major K. N. Ghosh. Dated 29th October, 1946.

Major S. B. Singh. Dated 9th November, 1946.

Captain Y. D. Deshpande. Dated 25th November, 1946.

Ty. Major A. A. Khan. Dated 27th November, 1946.

Major Aziz Ahmed. Dated 3rd December, 1946.

Major M. H. Alvi. Dated 3rd December, 1946.

Ty. Major W. M. S. Jonas. Dated 5th December, 1946.

Major D. J. Shroff. Dated 7th December, 1946.

Major A. K. Gupta. Dated 9th December, 1946.

Ty. Major C. L. Joshee. Dated 10th December, 1946.

Major V. S. Iyer. Dated 13th December, 1946.

Ty. Major D. S. Nand. Dated 14th December, 1946.

Ty. Major H. N. Hussain. Dated 14th December, 1946.

Major M. Das Gupta. Dated 14th December, 1946.

Major Balai Lal Roy Choudhury. Dated 17th December, 1946.

Major Gyan Chand Chawla. Dated 20th December, 1946.

Captain S. Q. B. Shah. Dated 23rd December, 1946.

Ty. Major D. R. Desai. Dated 27th December, 1946.

Major K. Abraham. Dated 28th December, 1946.

Ty. Major S. Govindarajan. Dated 6th January, 1947.

Ty. Major N. K. Basu. Dated 14th January, 1947.

Ty. Major A. P. Dewan. Dated 17th January, 1947.

Captain Kuppaswamy Govinda Raj. Dated 21st January, 1947.

Major T. D. Narang. Dated 26th January, 1947.

Captain S. Lal. Dated 29th January, 1947.

Major Y. G. Joshi. Dated 1st February, 1947.

Major Dameraju Sree Krishnamurthi. Dated 2nd February, 1947.

Ty. Major N. S. Sankaranarayanan. Dated 2nd February, 1947.

Ty. Major S. Singh. Dated 2nd February, 1947.

Ty. Major Gopendra Nath Mukherjee. Dated 5th February, 1947.

Major Subas Chandra Chatterjee. Dated 8th February, 1947.

Major A. A. Rawat. Dated 12th February, 1947.

Major K. L. Datta. Dated 14th February, 1947.

Ty. Major Clement Somasundaram David. Dated 16th February, 1947.

Ty. Major S. K. Ghosh. Dated 16th February, 1947.

Major M. A. M. Choudhury. Dated 20th February, 1947.

Ty. Major Mritunjoy Kumar De. Dated 23rd February, 1947.

Ty. Major Jatish Chandra Sen. Dated 25th February, 1947.

Major S. C. Roy. Dated 26th February, 1947.

Ty. Major Kshiti Bhusan Sen. Dated 1st March, 1947.

Captain Shiv Dev Singh. Dated 1st March, 1947.

Major Pargat Singh. Dated 3rd March, 1947.

Ty. Major K. C. Koshy. Dated 4th March, 1947.

Ty. Major F. N. Shroff. Dated 5th March, 1947.

Major Krishna Chandra Varma. Dated 20th March, 1947.

Ty. Major Vilas Sakhamam Paranjpe. Dated 21st March, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Major Budh Singh Sharma. Dated 5th February, 1946.

Ty. Major Muhammad Alam. Dated 21st October, 1946.

Ty. Major Kamakhya Charan Gosh. Dated 27th October, 1946.

Major T. J. Davies. Dated 26th December, 1946.

Major S. D. Suri. Dated 27th January, 1947.

Major Lalgudi Annadurai Venkataraman. Dated 7th February, 1947.

Captain Anwarul Haq. Dated 14th February, 1947.

Major Ajit Singh Gharajkhia. Dated 8th March, 1947.

Ty. Major Ajit Kumar Sen Gupta. Dated 8th March, 1947.

Major Lakshman Seshadri Nathan. Dated 9th March, 1947.

Major C. L. Chadha. Dated 15th March, 1947.

Major B. L. Agarwal. Dated 22nd March, 1947.

Ty. Major Maganlal Prem Chand Vora. Dated 29th March, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of Assam with effect from the date specified :—

Captain K. Datta. Dated 25th March, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are placed at the disposal of the Government of Bihar with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain M. Mohsin. Dated 15th April, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of C.P. and Berar with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain Tadepalli Shamsunder Row. Dated 21st April, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain. Their services are placed at the disposal of the Government

of the United Provinces with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Ty. Major Ganga Prasad Srivastava. Dated 4th May, 1946.

Captain Bhupendra Molan Banerji. Dated 10th May, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are placed at the disposal of the Government of Sind with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain Bhagwandas Wadhmal Advani. Dated 16th May, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain. Their services are replaced at the disposal of the Government of the Punjab with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captain S. A. Sheikh. Dated 4th April, 1946.

Captain M. A. Shakur. Dated 16th April, 1946.

Captain Hukam Chand Dhawan. Dated 8th June, 1946.

Captain M. R. Beg. Dated 11th July, 1946.

Captain S. M. M. Razvi. Dated 7th October, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are placed at the disposal of the Government of Mysore with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain N. Anandalwar. Dated 26th July, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of C.P. and Berar, Nagpur, with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain Ambica Prasad Dube. Dated 13th December, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are placed at the disposal of the Government of Baluchistan with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain A. M. Jafar. Dated 17th December, 1946.

The undermentioned officer is permitted to relinquish her commission on release from army service and is granted the honorary rank of Captain. Her services are replaced at the disposal of the Government of U.P. from the date specified :—

INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

(WOMEN'S BRANCH)

Captain (Miss) Shanta Jayawant. Dated 19th November, 1946.

The undermentioned officer is permitted to relinquish her commission on release from army service and is granted the honorary rank of Captain. Her services are placed at the disposal of the Government of Mysore with effect from the date specified :—

INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)
(WOMEN'S BRANCH)

Captain (Miss) Louise Mary Tollis. Dated 9th January, 1947.

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INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

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Captain Naunihal Singh. Dated 23rd April, 1946.

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Captain Brajamadhab De. Dated 26th April, 1946.

Captain Jagdish Chandra Sharma. Dated 1st May, 1946.

Captain Arulappan Paul Devadoss. Dated 6th May, 1946.

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 Captain Shaikh Mohamed Yousuf.
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8th February, 1947

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Captain Bagh Singh Dhillon.
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16th February, 1947

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(WITHIN INDIAN LIMITS)

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TREATMENT OF AMOEBIC LIVER ABSCESS WITH SECONDARY INFECTION

By R. N. CHAUDHURI, M.B., M.R.C.P. (Edin.),
T.D.D. (Wales)

Professor of Tropical Medicine
and

H. CHAKRAVARTI, M.B. (Cal.)

Assistant Research Worker

(From the Department of Tropical Medicine, School of
Tropical Medicine, Calcutta)

THE recognized treatment of amoebic liver abscess is a full course of emetine hydrochloride in single daily doses combined with closed aspiration of the cavity, which is repeated as required. The total dose of emetine in one course should not usually exceed 1 grain per stone body weight. Such conservative treatment is attended by a very low mortality rate and a considerable short period of disability. When, however, the abscess is secondarily infected with bacteria of various types open operation is regarded as the only treatment that is likely to do any good (Napier, 1943). But the results have been unsatisfactory and associated with a high mortality in practically all hands even in recent years. For instance, Berne (1942) treated 26 patients with open drainage, and 14 of them died. Ochsner and DeBakey (1943) reported a mortality of 3.6 per cent in a series of 83 cases in which emetine with or without aspiration was employed and a mortality of 22.1 per cent when open drainage was performed. Recently we had a case of amoebic liver abscess with secondary infection operated on, and he died.

In view of the high fatality rates associated with open drainage, there had been attempts to treat infected liver abscess cases with aspiration combined with sulphonamide or penicillin therapy. Alport and Ghalioungui (1939) reported a case of amoebic liver abscess, secondarily infected with *B. pyocyaneus*, in which recovery followed repeated aspirations and the local and systemic use of sulphonamide compounds. Noth and Hirshfeld (1944) reported a case of infected amoebic liver abscess treated successfully with aspiration and local instillation of penicillin. In view of these observations the following case is reported, the chief point of interest being the use of penicillin systemically as well as locally into the cavity of liver abscess secondarily infected with anaerobic streptococci.

Case report

The patient, a Hindu male, aged 32 years, was admitted to the Carmichael Hospital for

Tropical Diseases on the 17th June, 1946, for pain in the right side of the chest and abdomen with fever of seven weeks' duration. Prior to admission, the diagnosis of amoebic liver abscess had been made and he was given 15 injections of emetine, 1 grain each and was aspirated twice, about half a pint of chocolate coloured pus having been drawn on each occasion. He had suffered from dysentery a year ago and was treated with emetine at the time. On admission, he was very ill, toxic, running an irregular temperature with rapid pulse, and having night sweats. The liver was found enlarged from the right third intercostal space to two and a half inches below the costal margin and was very tender. The base of the right lung was dull on percussion, while auscultation revealed much diminished breath sounds and râles. Fluoroscopic examination showed the right dome of the diaphragm considerably raised and fixed. The white cell count was 16,000 per c.mm. with 81 per cent polymorphonuclear cells. Total plasma proteins was 9.2 grammes (albumin 3.3 grammes and globulin 5.9 grammes) per 100 c.c. The urine was clear; no ova or protozoa were found in stools. An exploratory puncture showed chocolate coloured pus with a faecal foul smell. The smear showed numerous pus cells and streptococci but the culture was sterile. A later culture of the pus under anaerobic conditions revealed streptococci. No *E. histolytica* was found.

In view of the previous experience and in consultation with Major Andreassen we decided to avoid open drainage in this patient and instituted penicillin therapy to combat the secondary infection along with aspiration.

In the first aspiration about one pint of pus was withdrawn and 50,000 units of penicillin in 20 c.c. of normal saline were introduced locally in the cavity. Some air was also injected at the same time and a skiagram of the liver was taken, which showed a fairly big abscess cavity with a fluid level (unfortunately the skiagram was lost). After this aspiration there was some amelioration of the local symptoms and the liver became smaller but the fever persisted. After three days the size of the liver and the local tenderness somewhat increased apparently due to further accumulation of pus in the cavity. He was then given penicillin injections, 20,000 units three hourly for seven days, and the cavity was aspirated repeatedly on alternate days at first and later at an interval of several days, being guided by the rise of temperature and local tenderness. Penicillin (50,000 units) was injected into the abscess cavity after each aspiration. During a period of five weeks he was aspirated ten times and six pints of pus were withdrawn. Thereafter the patient became gradually afebrile and his appetite improved. The white cell count gradually came down, and the serum albumin level increased while globulin decreased (see table).

Table showing leucocyte counts and plasma proteins

Date	W.B.C. c.mm. (in 1,000)	Polymorpho- nuclear cell (%)	PLASMA PROTEINS (GRAMMES %)		
			Total	Albumin	Globulin
18-6-46	16.0	81	9.2	3.3	5.9
2-7-46	11.5	76	8.9	3.8	5.1
19-7-46	13.0	68	7.5	3.45	4.05
6-8-46	10.5	64	7.9	3.95	3.95
16-8-46	8.0	65	7.5	3.9	3.6

The general condition of the patient steadily improved and he gained 8 pounds in weight. There was no more rise of temperature, no sweating, and though the liver could be just palpated, there was no tenderness. A fluoroscopic examination showed absence of any upward enlargement and the movement of the diaphragm was fairly good. During convalescence he complained of a slight catchy pain and discomfort in the right iliac fossa. The cæcum and ascending colon which could now be palpated with ease were slightly thickened and definitely tender; so he was given a course of six 1 grain emetine injections along with enterovioform by mouth with relief of these symptoms. He was discharged from the hospital on 21st August and was followed up as an out-patient for a month, and during that period he kept very well indeed and gained 5 pounds more.

Discussion

Clinically and radiologically this was a typical case of amoebic liver abscess. The faecal odour of the pus was due to secondary infection with anaerobic streptococci. Invasion of the liver might have occurred by portal infection, by direct spread from the adjacent structure, by blood-borne infection or by aspirations done outside before admission. The patient was seriously ill, and the general outlook seemed bad from the standpoint of therapy and prognosis. Considering the high fatality rate usually associated with surgical drainage mainly because of the unavoidable post-operative bacterial invasion of the abscess, and the value of the local penicillin therapy in such cases, it was decided to treat this patient by repeated aspiration combined with injection of penicillin locally and systemically. The result was so successful in this case that this method of treatment is recommended before considering open drainage in secondarily infected amoebic abscess of the liver.

Our grateful thanks are due to Major Andreasen, I.M.S., Professor of Surgery, Medical College, Calcutta, for valuable suggestions.

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A NEW TREATMENT OF SCABIES

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and

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WHEN it was discovered that a synthetic preparation which has been given the trade name phenyl cellosolve possessed marked sarcopticidal properties, the outcome was a natural desire to use it for the treatment of scabies, but before this was done it became necessary to determine any harmful side effects it might produce when applied to the skin of man.

Phenyl cellosolve* (monophenyl ether of ethylene glycol) is a liquid preparation, with an aromatic odour and has a bitter taste producing no tingling sensation of the tongue. It is mainly used as a solvent in industry. It is freely miscible with absolute alcohol and vegetable oil but not with mineral oil, e.g. liquid paraffin and kerosene oil. The oily mixture does not excite any appreciable irritation or burning when applied to a scratched or abraded skin. It is also well tolerated by babies and children. The oily mixture is innocuous to the eyes. It does not produce any ill effect when applied externally even over the whole body for days together.

Except for the treatment of pediculosis, it has not yet been employed for any other medical purposes. It can readily kill not only the adult louse but also the egg (Davis *et al.*, 1944; Hansens, 1945; Roy and Ghosh, 1947). When used for this purpose it is prepared with alcohol as follows :—

Phenyl cellosolve ..	5 per cent
Absolute alcohol ..	37.5 per cent
Water ..	57.5 per cent

When prepared with ground-nut oil it acts on the post-embryonic stages only and not on the eggs.

For the purpose of evaluating its action on *Sarcoptes scabiei* of man, the following methods were employed :

* We are particularly grateful to Messrs. Carbide and Carbon Chemical Corporation, manufacturers of synthetic organic chemicals, 30, East Forty-Second Street, New York 17, N.Y., U.S.A., for supplying us, free of charge, with a generous quantity of phenyl cellosolve.

(a) A minute drop of the oily mixture in groundnut oil was put on the freshly extracted mite placed on a glass slide and the excess of oil wiped off from its body with filter paper.

(b) The mite was released from the point of a needle on to the dorsum of the hand previously smeared very lightly with the oil. The mite was next removed to a glass slide as quickly as possible.

Only when all activities ceased, the mite was regarded as dead.

The results of tests carried out in the way stated above are shown below :

	Strength of the oily mixture	Duration of contact	Interval till death
Tests performed on glass slide.	5 per cent	15 seconds	12-18 minutes
	10 "	5-10 seconds	2-3 "
	15 "	5-10 "	Less than 1 minute.
Tests performed on hand.	10 "	15-30 "	1 minute
	10 "	1 minute	Immediate
	15 "	15-30 seconds	"

It will thus be evident that for destroying the mite on the body all that is necessary is to establish contact between the mite and the oily mixture (either 10 or 15 per cent) for a few seconds only. As a preliminary to this the burrows have to be opened and the mite exposed to the action of phenyl cellosolve and this is best done by scrubbing with soap and hot water while taking a bath.

Laboratory tests also reveal that for practical purposes the 10 per cent mixture can be regarded as efficient as the 15 per cent. We have therefore used the former in the treatment of all our cases.

This preliminary report includes the treatment of 35 cases of scabies amongst Indians only. Some of them were chronic cases suffering for more than a year. Many had thickened skin on the hands, axillary folds and inner surface of the thighs. Quite a large proportion of the patients treated had impetigo. The lowest age was 6 months. This was regarded as a particularly severe case. The highest age was 70 and the case had also a very severe type of the disease.

The following procedure for its use has been applied :

(a) Whenever possible a bath with soap and hot water was advised in the morning. Sometimes only sponging was done. Some outside patients had a very poor bath and did not take bath regularly.

(b) After drying the body, the oil was applied by means of cotton-wool over the entire body or over the affected parts only.

(c) Septic ulcers were cleaned and treated with the oil.

Only a little oil should be used as a thick application is not only unnecessary but also wasteful.

(d) The oil is applied again at night before going to bed and at any other time whenever there is itching. Scratching will cause the burrows to become exposed.

The oily preparation is quite stable and it is not necessary to prepare it fresh every time before use.

The details of treatment with the oily mixture of phenyl cellosolve will be published later when more clinical material has been obtained.

Phenyl cellosolve is marketed at a cost of \$0.76 per pound, f.a.s. New York. The cheapest vegetable oil available may be used for preparing the mixture.

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EARLY DIAGNOSIS OF TSUTSUGAMUSHI*

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EARLY diagnosis of tsutsugamushi (OXK typhus) often offers a serious problem to the clinician. The difficulty mainly arises in sporadic cases which are seen from time to time and in the first cases in an epidemic. This is because, firstly, no definite early clinical features of this disease have been described and, secondly, there is usually a striking general resemblance between tsutsugamushi and fevers of the dengue group as well as malaria. Of a series of 135 cases admitted to our hospital over 62 per cent had been diagnosed and treated as malaria for first 3 to 5 days before admission.

Most writers on scrub typhus emphasize that the diagnosis should be based on eschar, rash, adenopathy and Weil-Felix test. But a study of the table reveals that these symptoms may not be present according to some observers while their incidence according to others may vary greatly over a wide range.

Agglutination to OXK proteus strain in dilutions of 1 in 320 is considered by Stitt, Clough and Clough (1938) to be 'usually but not invariably diagnostic'. However, Megaw (1945) in his recent article on scrub typhus writes that 'occasionally reaction does not become positive till convalescence has set in. In patients who die

* Being a paper read at the Medical Section of the 34th Session of the Indian Science Congress.

Table showing features of tsutsugamushi as reported by different authors

	JAPAN	MALAYA	Boyd, 1935	Bardhan, 1944	INDIA			
	Nagayo, 1923	Lewthwaite and Savor, 1940			Tattersall, 1945	Menon, 1945	Singh, 1945	Najib Khan, 1943-45
Number of cases	..	250 + 15 (Eu)	35 + 21 (Eu)	41	300 (I) 200 (Eu)	120 (Eu)	107 (I)	100 + 35 (Eu)
Escher	..	Usual	5%	Nil	11%	56%	30%	15%
Rash	..	Usual	I—Nil Eu—All	Nil	64% (Eu)	64% (Eu)	35%	50% (Eu) 20% (I)
Adenopathy	..	Usual	40%	Nil	31% (I) 92% (Eu)	89%	82%	15%
OxK (titre)	1 : 200 on 11th-13th day.	1 : 250 on 17th day.	..	1 : 250 on 11th-22nd day.

Eu = Europeans.

I = Indians.

before the 4th day the reaction often remains negative till death, otherwise it becomes positive in a very high proportion of cases'. In Davidas's series a titre of 1 to 160 was reached on the 10th day; in Tattersall's (1945) series 80 per cent of the cases gave OXK agglutination of 1 in 200 between 11th and 13th day of illness; in Menon's (1945) cases the titre of OXK agglutination on the 17th day of illness was 1 in 250 and in my series a titre of 250 of OXK proteus was reached between the 11th and 22nd day of illness. The highest titre was reached on the 22nd and 28th days. Thus if the diagnosis of scrub typhus is to be based on Weil-Felix test, in most of the cases it will be in the state of convalescence that the diagnosis will be made.

Early diagnosis of tsutsugamushi is not only important from the epidemiological point of view, but also from the viewpoint of the patient who should not be moved after the 5th day. Thus the question arises: On what is the diagnosis of scrub typhus to be based? The clinical aspect of the case often presents some important signs and symptoms which can prove to be helpful to the physician in the early diagnosis. These are outlined below and were noticed in practically all my cases but the observation of these points was not the only criterion of the diagnosis; careful records were also kept and the diagnosis finally checked by the OXK titre rising and eventually being over 1 to 250.

1. *Headache*.—It was complained of by all the patients. It is frontal in type, severe, intractable and unrelieved by aspirin or other analgesics. The character of the headache is typical and is often described by patients as 'boring' or 'piercing', which 'moves from one temple to the other and back again'.

2. *Asthenia*.—This is out of proportion to the physical signs and the duration of the illness and is seen from the very beginning. The patients themselves feel the sudden loss of energy so much that talking is a severe exertion to them.

3. *Lethargy and apathy*.—They are a constant feature of the disease. After recovery some of the intelligent patients described their state during their illness as not wishing to be disturbed or make any effort but sink in the bed, no matter how uncomfortable, and take no interest in the surroundings no matter how annoying or dirty.

4. *Delayed reaction time*.—It is another feature of scrub typhus. Even simple questions are understood by the patient very much more slowly than normally. Patient is usually fully conscious, but understanding is slow. This fact is often attributed to deafness, but talking to patients after their recovery has elicited that they heard but took a long time to understand.

5. *Vacant expression*.—It was found in all the patients. This expression with fully sensible mentality is always striking.

6. *Eyes* have a peculiar state and that is accentuated by unwillingness on the part of the patient to move his eyes. When the patient is asked to look towards the side, he will rather move his head than the eyes. After recovery the patients often said that they were tired of looking at the objects opposite to them in their beds, but they could not move their eyes and the only way to avoid looking on the monotonous objects, like the face of the patient on the bed opposite to them, was to shut their eyes.

7. *Deafness* of the nerve type was present in more than half of our cases and in 35 per cent of Tattersall's cases.

8. The combination of asthenia, lethargy, apathy and increased reaction time presents a typical picture of the patient who lies in the bed with half closed eyes and takes no interest in the surroundings and is loath to make any movements. At one time when a great number of patients were being admitted to the hospital and we were on the look out for scrub typhus it was found that if a patient with fever who was suspected of scrub typhus was asked to sit up, and he did sit up, he was found not to be a case of scrub typhus. This rough

test was found reliable time and time again as checked by other observations and investigations.

9. *Hypopiesis* was a significant fact in all our cases and evident fairly early in the disease. In the Europeans the systolic blood pressure was between 100 and 115 mm. of mercury and in the Indians between 90 and 105 mm. of mercury. This low blood pressure persisted for a considerable time after recovery. This is not to be wondered at when we know that Davidas found in 9 of his 15 post mortems of scrub typhus severe myocarditis while the other six had similar affection of the heart, but less severe.

10. *Fundal changes* were seen in over two-thirds of our cases. The usual picture was papillitis, but in some optic neuritis was seen. Papillitis was of $\frac{1}{2}$ to 1 D. In some of the cases acute retinitis was also present. Major Y. K. C. Pundit reports that a rare phenomenon is uveitis. In this condition the muscae volitantes caused by mild degeneration of the vitreous persists for a long time. In some cases after the fever had subsided and the patient was well enough to sit up Captain T. Donogon, the Ophthalmologist, found central scotoma. This seems to clear up after complete convalescence. Therefore examination of the fundus oculi is often helpful in the diagnosis.

11. *Blood picture*.—The total white cell count gives no help in the diagnosis, but the blood picture is often helpful. There are usually present 'peculiar' non-granular cells. These cells could not be classified in any known type, but appear to be a cross between lymphocytes and monocytes. They appear fairly early in the disease and were present in most of our cases. They were found to be 15 to 50 per cent in different cases. In some cases these 'peculiar' cells mislead to the diagnosis of infective mononucleosis.

12. Early morning remissions of fever were seen in the 4-hourly charts in all our cases. The fever comes down 3 to 5 degrees between the hours of 2 a.m. and 6 a.m. without there being any great alteration in the pulse rate.

These twelve points, if carefully observed, help the clinician to come to an early diagnosis in case of tsutsugamushi.

Summary

The difficulties in the early diagnosis of scrub typhus are emphasized but certain signs and symptoms, viz, headache, lethargy and apathy; vacant expression; stare of the eyes; deafness of the nerve type; hypopiesis, fundal changes and blood picture and early morning remissions are helpful.

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LEUCOCYTES IN NORMAL RHESUS MONKEYS

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DURING a study of experimental measles in rhesus monkeys the available literature was consulted for the normal figures of total and differential white cell counts in these animals. It was found that the results reported by 11 different authors (table I) varied within a wide range. The differential count was always mentioned in percentages which either gives no idea of the absolute numbers, or can even present a wrong picture. In table III with a percentage of 43.8 the total number of lymphocytes is 7,670, and with a higher percentage of 52.7 the total number is actually reduced to 6,352.

The present study was undertaken to find out the reason for these vastly different results reported by various authors. Twenty-two animals were examined daily for 4 to 12 days until a steady level was obtained. All the animals were apparently healthy, considering their daily temperature, body weight, activity, appetite and stools.

The counts were made at the same time daily before feeding. The animal was caught without being much excited and the blood was drawn when it was calm. Freely flowing blood was drawn from a razor blade cut over the marginal ear vein directly into a pipette. Smears made by the coverslip method were stained with Wright's stain. Two hundred cells were counted, from each smear, but if unusual results were noted, an additional 200 cells were counted. Our data are appended at the end in table I.

Total white cells.—These were found to vary from 10,650 to 29,400; average 18,490, standard deviation 5,200. The animals running high counts between 20,000 and 30,000 had proportionately greater daily fluctuations, while those between 10,000 and 14,000 showed a steadier level. When some of the counts were arranged in order of magnitude of the mean value, the standard deviation of these means increased with the value of the mean, but the coefficient of variation remained more or less the same (table II). It indicated a greater scatter in the daily counts of the former series, which

raised the mean value. In spite of these fluctuations, which were due to some unrecognized external or internal stimuli, the animals were apparently healthy. But the significant fact was that these fluctuations affected mainly the neutrophils. A similar observation has been made on kittens by Hammon (1940).

In table III, the total leucocytes are grouped according to magnitude in four categories. The

leucocyte count, an increase or decrease in neutrophils being entirely responsible for this change. It explained the divergent figures for these cells reported by different workers as shown in table I.

Conclusions

In any experiment on monkeys little importance can be attached to a change or daily

TABLE I*

Authority	Number of animals	Number of counts	Maximum	Minimum	Average	Polymorphs, per cent	Lymphocytes, per cent
Wills and Stuart ..	13	113	28,000	8,200	15,200	75-78	89-22
Anderson and Neill ..	10	100	12,600	8,300	11,200	32-50	38-63
Billimoria ..	27	..	32,600	8,600	18,100	36	61
Krumbhar and Musser	13	20	15,000	8,900	13,400	47	46
Lucas and Prizer ..	3	3	31,600	23,600	26,500	42-52	27-48
Taylor ..	40	121	..	..	22,200	41	54
Hecktoen and Eggers ..	4	4	23,900	15,500	18,500	24-65	22-57
Fox ..	..	..	25,000	5,000	..	54-44	47-83
Hall ..	8	..	20,500	7,500	14,200	43	52
Shukers ..	19	140	34,700	5,600	15,100	81-87	89-14
Purdy ..	2	26	14,000	8,000	11,080	34	64
Our study ..	22	135	29,400	10,650	18,490	10,820	7,100

* Modified from Scarborough (1931).

TABLE II

Total mean count	Standard deviation	Coefficient of variation	Total mean count	Standard deviation	Coefficient of variation
10,650	1,640	15.0	22,000	2,940	13.1
10,700	1,460	13.6	22,940	3,390	14.8
12,200	1,440	11.8	27,000	2,560	9.4
12,600	1,330	12.5	29,300	4,130	15.0
14,280	1,820	12.7	29,400	2,160	7.3

TABLE III

Number of counts	..	51	43	24	17
Limits ..	..	9,000-15,000	15,000-20,000	20,000-25,000	25,000-30,000
Average total leucocytes ..	..	12,040	17,500	22,320	28,630
Neutrophils, per cent ..	..	43.2	53.0	62.4	71.2
Lymphocytes, per cent ..	..	52.7	43.8	34.9	25.4
Total neutrophils ..	..	5,203	9,287	13,941	20,384
Total lymphocytes ..	..	6,352	7,670	7,807	7,272

neutrophils showed an increase in the percentage and total number relative to the rise in the total leucocytes. The lymphocytes showed a fall in the percentage with the rise of total cell count, but their total number was fairly constant. The standard deviation and coefficient of variation for the neutrophils were 5,200 and 48.05 respectively, and for the lymphocytes 1,500 and 21.4. These figures, again, indicated that lymphocytes remained relatively constant and fluctuated less than the neutrophils. Moreover in a monkey running a low leucocyte count the lymphocytes were higher in percentage and total number than neutrophils, with the reverse picture in an animal with a high

fluctuation in the total leucocyte count and neutrophils unless the character of the base line has been studied before the experiment, while a change in the lymphocytes is always significant.

The lymphocytes in the series varied between the extreme limits of 4,100 and 13,450; average 7,100; 79 per cent of the counts were within a range of 4,000 to 9,000. A fairly constant level was maintained in a particular animal and a change could be considered of pathological significance.

The limits for neutrophils were from 2,540 to 21,000, average 10,820; only 67.4 per cent of the counts were within a range of 3,000 to 12,000. Marked daily fluctuations were present

in some apparently healthy animals without any recognizable cause.

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SEROLOGICAL TECHNIQUE (contd.)

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Dilutions of complement containing required MHD of complement.—If the titre, as given in the example, is 1 in 60, then a 1 in 60 dilution contains 1 MHD. Two MHD will be contained in a 2 in 60 or 1 in 30 dilution. Similarly, 3 MHD, 4 MHD and 5 MHD will be contained in 3 in 60 ($= 1$ in 20), 4 in 60 ($= 1$ in 15) and 5 in 60 ($= 1$ in 12) respectively.

The restriction in the quantity of the complement used in the reaction is effected by restricting the MHD in the dilution used.

DETAILS OF LECITHIN COMPLEMENT FIXATION (LCF) FOR SYPHILIS, COMMONLY CALLED WASSERMANN REACTION (WR)

Rows and Columns of Tubes in a Rack

The diagram gives the arrangement of the tubes in rows from left to right (illustrated by

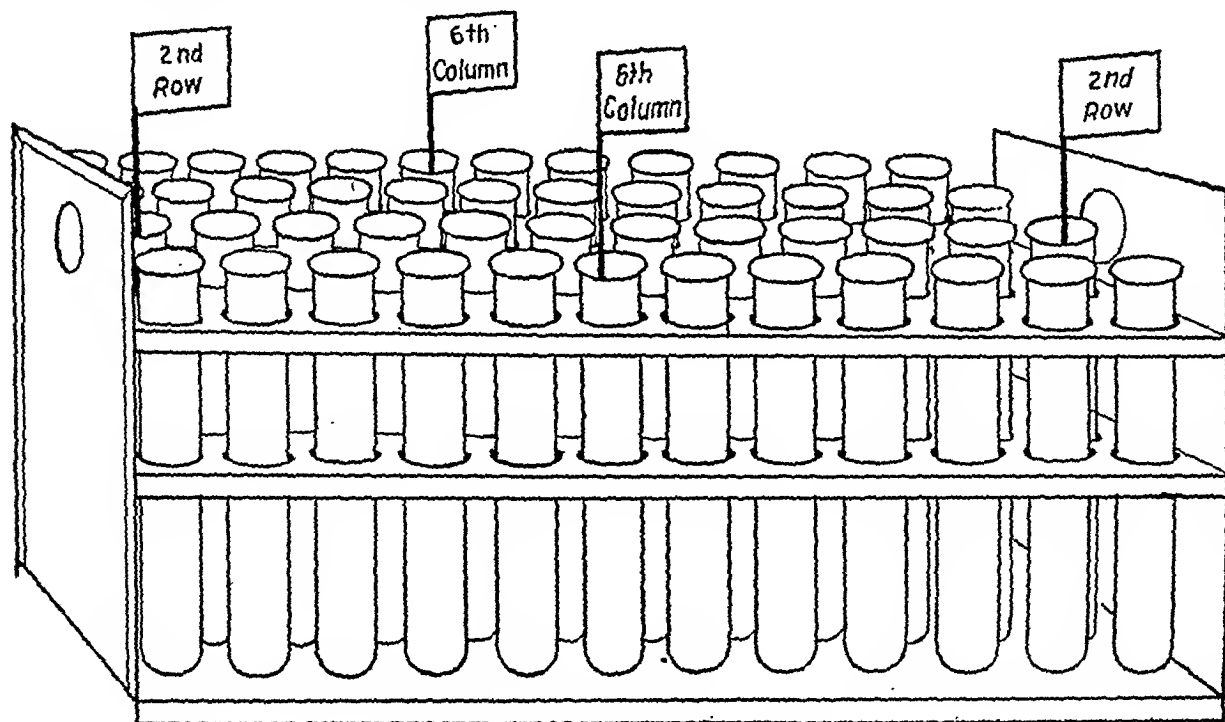
the 2nd row in the diagram) and in columns from front backwards (illustrated by the 6th column in the diagram).

For titration of reagents metal racks like the one depicted are used while for the routine tests wooden racks carrying single rows of tubes may be used. The wooden racks are placed four deep to form columns like the metal racks.

The Antigens

The writer uses 4 antigens, namely, plain alcoholic liquid heart extract antigen, antigen from the same extract cholesterolized, the cholesterolized extract phenolized in dilution, and antigen from Bordet's extract cholesterolized.

The plain alcoholic liquid heart extract.—Ten grammes of human heart muscle free from fat are ground up into paste with clean sand and added to 100 c.c. of absolute alcohol in a wide mouthed bottle. The bottle is stoppered, shaken vigorously and left in a cupboard for 24 hours. Next day the extract after another vigorous shaking is filtered into a narrow mouthed reagent bottle. (The funnel carrying the filter paper is covered with a Petri dish.) The filtrate is the extract. When several extracts are prepared (and stored in a cupboard) they are tested together for suitability concerning: (1) *Turbidity.* A 1 in 15 dilution in normal saline should be obviously turbid or at least as turbid as the one made from a satisfactory extract in use. For making the dilution a measured quantity of the extract is put into one tube and the required quantity of saline into another. The saline is poured into the extract, shaken and the mixture poured into the 2nd and back into the 1st tube. The dilution is the antigen. (2) *Hemolytic power.* 3 volumes



Rows and Columns of Tubes in a Rack.

of the dilution are left in contact with 1 volume of sensitized and standardized sheep rbc (dilution 0.75 c.c. + rbc 0.25 c.c.) at 37°C. for half an hour. There should be no trace of hæmolysis. The tube is left overnight at ice box temperature and examined next morning when the rbc have settled down. The hæmolysis occurs only occasionally. Excess of antigen is used to make certain of the hæmolysis. (3) *Anticomplementary power*. 1 volume added to 1 volume of complement dilution containing 1 MHD should not depress the hæmolytic power of the complement (complement dilution 0.25 c.c. + normal saline 0.25 c.c. . . . incubated . . . + sensitized rbc 0.25 c.c. . . . incubated = complete hæmolysis). (4) *Complement fixing power*. The dilutions are put up with a pooled serum from 6 cases (also see *the known positive serum*) of untreated florid secondary syphilis, diluted 1 in 10, 1 in 25 and 1 in 50 and 4 MHD of complement, as shown in the TABLE OF TITRATION OF HEART EXTRACT.

of hæmolysis, due to the serum being anticomplementary, in this tube.) After the mixtures have been left at room temperature for half an hour and in the incubator for half an hour the sensitized rbc suspension is added and the tubes reincubated. Negative (—) and doubtful (±) reactions are read the same day while positive reaction (+) and traces of hæmolysis (T) are read the next day. Serum control must be —. 1st row in all columns must be +, 2nd row in all columns must be T, 3rd row in all columns must be — or ?— (almost negative, tube of full colour and without coloured deposit next day). The extracts giving the required fixation are selected for pooling. A fixation lower than the one given by the extract already in use is never accepted. At least six extracts should be pooled to provide the antigen.

The extracts giving higher fixation are also selected but kept aside (for mixing with weaker extracts). Such extracts are met with occasionally only.

TABLE OF TITRATION OF HEART EXTRACT

Column number	I	II	III	IV	
(Rows of tubes, running like this \rightarrow , are grouped into columns, running like this \downarrow , see sketch.)	From front backwards \downarrow containing: comp. dil. 4 MHD per vol. 1 vol., and 1 vol. of 1 in 15 dil. in saline of				
	heart ext. 1	heart ext. 2	heart ext. 3	heart ext. 4	
Third row, from left to right \rightarrow . For serum dil., 1 vol. of 1 in :	50	50	50	50	
Second row, from left to right \rightarrow . For serum dil., 1 vol. of 1 in :	25	25	25	25	
First row, from left to right \rightarrow . For serum dil., 1 vol. of 1 in :	10	10	10	10	
					An extra tube (serum control) for :— — Serum dil., 1 in 10, 1 vol. — Comp., 2 MHD per vol. 1 vol. — Saline 1 vol.

For 4 extracts 13 tubes are required: four columns from front backwards, 3 rows from side to side and 1 extra tube (see TABLE OF TITRATION OF HEART EXTRACT).

Into each column is put dilution from a different extract.

More columns are added for more extracts. A suitable extract already in use is always included for comparison. Each column has the same extract. Each row has the same dilution of serum. The extra tube is the serum control for the whole rack. (There should be no inhibition

The extracts giving lower fixation are corrected by concentration. A 1 in 10 dilution in saline (instead of 1 in 15) is tested for hæmolytic power, anticomplementary power and complement fixing power. If it comes up to the standard 15 c.c. of the alcoholic extract are evaporated to 10 c.c. An intermediate concentration (15 c.c. evaporated to 12½ c.c.) or mixing with a strong extract (kept aside for the purpose) may suffice for some extracts. Weak extracts are frequently found. An extract which cannot be corrected (does not improve

Bordet's antigen.—(1) One hundred grammes of human heart muscle cut into pieces (not minced) are left in contact with 125 c.c. of absolute alcohol for a week. (2) The alcohol is poured off and the muscle dried in an incubator for several days (should be like pieces of wood). (3) The dried muscle is left in 200 c.c. of acetone for a week. (4) The acetone is

Titration of the complement in the presence of antigens.—The complement is titrated in the presence of (a) antigen 1, from plain alcoholic cholesterolized extract; (b) antigen 3, the same dilution prepared with phenolized saline; and (c) antigen 4, dilution of cholesterolized Bordet's extract, as shown in the TABLE OF TITRATION OF THE COMPLEMENT IN THE PRESENCE OF ANTIGENS, in a slightly different order.

Column number	I	II	III	IV	V	VI	VII	VIII
(Rows of tubes, running like this →, are grouped into columns running like this ↓.)	For complement dilutions of 1 in:—							
	20	30	40	50	60	70	80	90
Fourth row for:—Comp. dil. Ant. 3 .. (Ordinary phenolized.)	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.
Third row for:—Comp. dil. Ant. 4 .. (Bordet's) Saline ..	1 vol. 1 vol. 1 vol.	1 vol. 1 vol. 1 vol.	1 vol. 1 vol. 1 vol.	1 vol. 1 vol. 1 vol.	1 vol. 1 vol. 1 vol.	1 vol. 1 vol. 1 vol.	1 vol. 1 vol. 1 vol.	1 vol. 1 vol. 1 vol.
Second row for:—Comp. dil. Ant. 1 .. (Ordinary.)	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.	2 vol. 1 vol.
First row for:—Comp. dil. Saline ..	1 vol. 2 vol.	1 vol. 2 vol.	1 vol. 2 vol.	1 vol. 2 vol.	1 vol. 2 vol.	1 vol. 2 vol.	1 vol. 2 vol.	1 vol. 2 vol.

An extra tube for
Comp. dil. 1/90 1 vol.
Ant. 3 1 vol.
Saline 1 vol.

An extra tube for
Comp. dil. 1/90 1 vol.
Ant. 1 1 vol.
Saline 1 vol.

1st and 3rd rows have only 1 volume of complement while 2nd and 4th rows have 2 volumes.

1st row will give the titre of the complement acting alone while 2nd, 3rd and 4th rows give the titre when the complement is acting in the presence of the antigens. Antigen 2 is not used in the titration.

All tubes have up to this stage three volumes of total fluid (conveniently a volume = 0.25 c.c.).

The tubes are left at room temperature $\frac{1}{2}$ hour and in the incubator $\frac{1}{2}$ hour. 1 volume of sensitized rbe is then added and the tubes re-incubated for $\frac{1}{2}$ hour. In the 1st row the last crystal clear and ruby red tube from the left gives the MHD of the complement when acting alone, while in the other rows a tube *just falling short* of this clarity and redness will give the MHD when the complement is acting in the presence of antigen.

Qualitative and quantitative differences in complement.—Ideally and typically the 1st row should give the MHD in 1 in 40, 1 in 50 and 1 in 60 dilutions of complement. This is the *optimal titre*. A titre below 1 in 40 is *low* while that above 1 in 60 is *high*.

The 3rd row (with Bordet's cholesterolized antigen, Ant. 4) usually gives the same titre. Antigen 4 is not anticomplementary, that is why the volume of complement dilution in the 1st and 3rd rows is the same. When doubt arises as to whether the right or left of the two tubes in the 1st row should be taken for the MHD the one agreeing with the tube selected in this row should be preferred.

Again ideally and typically the 2nd row which contains *double* the quantity of complement contained in the 1st row (the antigen being anticomplementary to the extent of 1 MHD) should give the MHD in the same column as the 1st row. This is the *optimal reaction*. If the 2nd row lags behind, the complement is *cholesterol shy*. More than 2 MHD of it is needed for the complete lysis of rbe in the presence of the cholesterol contained in the antigen. If the 2nd row is ahead of the 1st, the complement is *cholesterol fast*. Less than 2 MHD of it is needed for the complete lysis of rbe in the presence of the antigen.

A combination of optimal titre and optimal reaction gives the best results in LCF (WR). If possible standardization of the heart extracts (by selection or correction) should be undertaken on a day when such a complement is available.

The reaction remaining optimal when the titre is high or low the fixation is excessive or poor respectively. Adjustment of the MHD is necessary in the test proper.

A cholesterol fast complement gives less fixation. Adjustment in the antigen-complement system is needed in the test proper.

A cholesterol shy complement gives more fixation. Another adjustment in the antigen-complement system is needed in the test proper.

Adjustments in the MHD. 1. *For complement of optimal reaction.*—(1) When the titre is high reduce the reading of MHD by 10 : for 1 in 90, 1 in 80 and 1 in 70 take 1 in 80, 1 in 70 and 1 in 60 respectively. The excess in fixation will be balanced by the excess in the MHD. (2) When the titre is low do not insist on a crystal clear and ruby red tube in the 1st row : one falling short of it will suffice. The corresponding tube in the 2nd row may be correspondingly imperfect.

2. *For cholesterol fast complement.*—(1) When the MHD in the 2nd row is ahead of that in the 1st row by a convenient fraction, reduce the MHD in the test proper by that fraction. Example one : 1st row tube in column 1 in 60 and 2nd row tube in column 1 in 90; the difference is $\frac{1}{2}$ of 60; work with 1 in 60 and reduce the 3 MHD and 5 MHD of the test proper (*vide infra*) to $2\frac{1}{2}$ MHD and $4\frac{1}{2}$ MHD. The deficiency in fixation will be balanced by the deficiency in the MHD. Example two : 1st row tube in column 1 in 40 and 2nd row tube in column 1 in 80 : the difference is equal to 40; work with 1 in 40 and reduce the 3 MHD and 5 MHD of the test proper to 2 MHD and 4 MHD. Intermediate figures may be taken, always erring on the side of having a slight excess of complement. (2) When the fraction is not convenient and the difference is not much, do not adjust. Example : 1st row tube in column 1 in 60 and 2nd row tube in column 1 in 70; work with 1 in 60. (3) When the fraction is not known and the titre is high, reduce 3 MHD and 5 MHD to 2 MHD and 4 MHD. Example one : 1st row tube in column 1 in 90, 2nd row tube all clear and the extra tube fully or almost fully haemolysed; work with 1 in 90 and reduce 3 MHD and 5 MHD to 2 MHD and 4 MHD. Example two : 1st row tube in column 1 in 80, 2nd row all clear and the extra tube fully or almost fully haemolysed; work with 1 in 80 and reduce as before. Example three : 1st row tube in column 1 in 70, 2nd row all clear and the extra tube substantially haemolysed; work with 1 in 70 and reduce as before. (4) When the titre is not high and none of the devices so far described fits in, attempt a fit along the lines of devices (1), (2) and (3) with phenolized antigen (no. 3) and use this antigen in the test.

The MHD is not adjusted for Bordet's antigen.

3. *For cholesterol shy complement.*—(1) When there is a lag of one or two tubes only, take that tube in the 1st row which corresponds to the clear tube in the 2nd row. Example : 1st row tube in column 1 in 60 and 2nd row tube in column 1 in 40; work with 1 in 40. The excess in fixation will be balanced by the excess in the MHD. The lag is usually confined to this limit. (2) When the 2nd row tubes follow the 1st row tubes but are less clear than usual, mix the cholesterolized extract two parts with uncholesterolized extract one part and dilute the mixture in the usual way. (3) When the 2nd row tubes are only half lysed, mix the

cholesterolized extract one part with uncholesterolized extract one part. (4) When the 2nd row tubes are hardly lysed but the 3rd row tubes, with Bordet's antigen, are lysed, mix the cholesterolized extract one part with uncholesterolized extract two parts. Antigen controls with 2 MHD of complement will be necessary for (2), (3) and (4). When even the 3rd row tubes are hardly lysed reject the complement.

RHEUMATIC DISEASES AND MOUTH INFECTION

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THE problem of focal infection in relation to rheumatic diseases has received too little critical consideration. The subject must be approached first from the standpoint of the nature of systemic diseases. In other words we have got to know what rheumatism and arthritis are.

The term 'rheumatic diseases' embraces a big group of various illnesses which have their chief characteristic pain in and around joints. 'Rheumatism' is not a disease but a generic term for many illnesses. These illnesses can be divided into two main divisions: (1) articular and (2) non-articular. In this paper I will discuss only rheumatoid arthritis and osteoarthritis which occur with about equal frequency, but they differ greatly in aetiology, clinical, pathological and therapeutic considerations.

Rheumatoid arthritis

It is a general progressive systemic disease, the chief manifestations being the articular changes. At the onset the patient usually complains of malaise, fatigue, poor appetite and loss of weight. Then several joints begin to ache and become increasingly painful, swollen, tender and sometimes red: when the finger joints are involved they become fusiform in shape as a result of the capsular swelling of the proximal interphalangeal joint. If unchecked great destruction and deformity result. The primary and characteristic pathologic change is inflammation of synovia which lines the capsule and of the fibrous capsule of the joint, and then secondary changes with destruction of the cartilage, atrophy of the bone, deformity, dislocations and ankylosis.

The cause of rheumatoid arthritis is unknown. The four most popular theories are: (1) infectious, (2) metabolic and nutritional, (3) neurogenic, and (4) endocrine. I will discuss the first theory here.

There is more evidence to support this theory than any other. In the first place many patients give history that the disease started shortly after infection. The laboratory

changes that accompany this disease, such as leukocytosis and increased sedimentation rate, support this infection theory. The theory of 'focal infection' started long ago, was popularized by F. B. Billings of U.S.A. and Priv. Dozent Stein of Vienna, and was warmly received because it suggested a reasonable approach to the disease. As years passed the enthusiasm gradually died down.

Attempts made to produce the disease in animals by the use of all sorts of organisms were not very encouraging. Arthritis has been produced repeatedly in animals by the injection of organisms removed from persons suffering from rheumatoid arthritis but it was unlike the characteristic inflammation in human beings. While working in the house staff at the focal infection department of the jaw department of the University Hospital, Vienna, under Professor Pichler and Priv. Dozent Stein (focal infection abtiefung der kiefer station der Universitat Zü Wien) I have witnessed many cases of arthritis in animals produced by sealing the organisms in teeth to stimulate a focus of infection, but at the same time I must confess that it was not the counterpart of rheumatoid arthritis in man. To prove that a focus of infection really causes arthritis we have got to find out whether the following evidence does exist: (1) a focus must always be found, (2) some substance, such as bacteria, host cell products of inflammation, must get from that focus to the infected parts, (3) the inflammation in the joints must be proved as a result of some specific substance that gets from a focus to the affected parts. But as these evidences cannot be obtained, the problem remains a theory. After all these one is naturally left without proof and with many questions as to whether focal infection accounts for this disease.

In spite of the above arguments my personal 'clinical impression' is that the patients benefited by the removal of infected teeth. I must hasten to add at the same time that the teeth should not be removed just because they are still in the head of the patient suffering from rheumatoid arthritis. This practice should never be encouraged. I advocate that abscessed teeth should be scarified and infected gums should be properly treated. This will also indirectly help the patient, as by such procedures the patient's general health may be improved and thereby his ability to combat the disease. I feel very strongly that rheumatoid arthritis results from alteration of host's tissue as a result of 'trigger mechanism' that in very many cases probably is localized infection at the roots of teeth, tonsils or elsewhere. Host tissue damaged by any such irritating illness may liberate antigenic substances which react with antibodies in joint synovia and capsule causing inflammation. Once initiated in this way, rheumatoid arthritis may continue, recur or become exacerbated without continuation or recurrence of the original trigger mechanism.

Case history

Miss S. C., age 22. Before the onset of the disease, the patient was very active, but gradually began to feel tired. Loss of appetite and weight. Pain in the spinal column joint and ultimately several joints began to ache and swell especially the fingers. General condition: irregular menstruation; pain and tenderness of the head; antrum and tonsils good.

Laboratory findings.—Increased sedimentation rate of the R.B.C., mild anæmia and leukocytosis.

Gums.—Healthy.

Teeth.—Upper right canine and first molar (right) filled with amalgam.

X-ray.—Examination of teeth revealed imperfect root canal treatment in both. An apical abscess in the molar and some degenerative changes in the apical portion of the canine.

Upper first molar was extracted. Old filling of the canine was removed, apicoectomy performed on it and the pulp canal was filled with silver point. The patient recovered amazingly in a very short period.

Case history

Mrs. S. D., age 38. The patient was overweight, a great pan-chewer (about 100 a day). She felt pain practically in all joints. History of low and intermittent fever, sub-maxillary glands swollen.

Laboratory findings.—Showed increased sedimentation rates of the red blood cells and leukocytosis.

Gums and teeth.—Gums extremely unhealthy, upper right and left first and second molar teeth loose, formation of gum boil on the palatal aspect, pus coming out on pressure, the entire area swollen and painful. My first duty was to extract gradually all the upper molars on both sides. It is to be noted that the patient was so bad that I was called at her house for extraction. One week after my last visit the patient was brought to my office. I found her definitely better, the rest of the gums were treated in the routine manner. Vitamins B and C were prescribed in an intensive dosage. Four weeks after the patient was as normal as most of us.

Osteo-arthritis

It is a degenerative condition of middle age and old age which affects the articular cartilages and weight-bearing surfaces of the larger joints, such as knee and hips and articulations of spinal column. The pathologic changes differ from rheumatoid arthritis and there is no inflammation of the capsules as in other case. There are degenerative changes with fibrillation of the articular cartilage at the place of the greatest weight, bearing or use, usually in the central portion of the joint. These degenerative changes advance with the progress of the disease, the cartilage becomes thinned and the surface irregular. Further progress of the

disease leads to increased articular and osseous changes and irregularity of joint surface.

There is no evidence that oral sepsis is primarily concerned with the aetiology of this type of arthritis. However it is my clinical experience that a patient who complains of pain in the shoulders or knees is generally found to have infected teeth or tonsils, and they should be dealt with on their merits.

Conclusion

In appraising the problem of infection in relation to arthritis, the first consideration is to know whether the patient has arthritis, secondly, if he has, what kind of arthritis. Thirdly, whether a focus of infection is present, if so, whether the infection can reasonably be the cause of that type of arthritis. It is illogical to expect a cure of gonococcal arthritis by extracting the teeth even if they are infected. It is my clinical experience (though very limited) that patients with rheumatoid arthritis having abscessed teeth as the focus of infection have been cured by their removal. In osteo-arthritis the removal of the infected teeth was of no great help to the patient.

Lastly, I would like to appeal in this connection to the authorities responsible for the medical research that fresh attempts be encouraged for careful reconsideration and further clinical evaluation of this problem in our research institutes in Calcutta.

ULTRA-SHORT-WAVE THERAPY IN MEDICAL PRACTICE

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Short wave and its mode of action.—All electromagnetic waves are due to the rapid to and fro movements of electrical charges and are propagated as transverse oscillations in ether, while extraordinary rapid reactions in the atom are the basis of visible and still shorter wave radiations. The electric waves in the narrow sense of the Hertzian waves occur as the result of oscillations of fairly large electric charges in oscillatory circuits.

With a frequency of 10^8 cycles per second the wave-length is 3 metres and with 10^7 cycles per second it is 30 metres. The wave-lengths we are now concerned with are generally between 3 and 30 metres. Waves under 100 metres are called short while those under 10 metres are termed very short or ultra-short. Generally speaking, it is the electric field, as it exists between the condenser plates of a closed oscillatory circuit, and not the electromagnetic waves that is more used and as such it is not quite correct to name it 'Short-Wave Therapy' or 'Ultra-Short-Wave Therapy'. But the expression has become generally current and the division according to wave-length has proved very convenient.

Mode of action.—Under the influence of the electric field force between the condenser plates,

movements of molecules and ions take place and the energy becomes mostly changed into heat. The fundamental difference in the working of the short-wave field as compared with any of the usual currents hitherto used (e.g. diathermy) is that the energy does not flow through the dielectric as a purely conductive current but attacks the smallest particles themselves in the interior of the dielectric as a field force so that the nature and strength of the action depends on the composition of the dielectric. Two current components may be imagined to occur in the dielectric. (1) A conduction current component which results in producing heat. (2) A capacity component or displacement current which induces the deep-seated effect. This latter component comes into play when the frequency reaches to 10 million cycles or more corresponding to a wave-length of 30 metres or more.

There are two methods by which high frequency electric oscillations can be started. (1) Impulse production—spark gap method. The frequency by this method is about 1 million cycles corresponding to 300 to 500 metres. This is not used. (2) Valve transmission method. In this method undamped oscillations with high output can be started with electronic valves. An ultra-short-wave apparatus for general use must give an output of at least 300 watts with 4 to 6 metres effective wave-length. With a two-valve transmitter it is possible to change the wave-lengths between 3.25 and 7.2 metres. A transmitter with 350 watt output can be used for the production of wave-lengths of 6 to 12 metres. The apparatus used by me is a dual-wave generator, Model S.W. 55 of Westinghouse Electrical International Company, working in U.S.A., at 230 volts and at 6 amperage.

Technical detail of the apparatus and its working is omitted due to lack of space.

Effects of short-wave-condenser field in liquids, tissues and organs

Every tissue has an optimum wave-length, the application of which would produce the maximum warming effect. When equal quantities of full blood, serum and clot from the same specimen were subjected to a field of 3 metres wave-length, it was found that the full blood was heated to about 10.5°C., the serum to about 8.5°C. and the clot to 11.5°C. The R.B.C. even in undiluted blood resist heat more strongly than the serum.

Human tissues.—Within a piece of tissue in the body single or group of cells or even parts of cells behave differently from those in their close proximity. A selective heating of individual part takes place depending on the composition of the part. Bacteria may also react independently of their nutrient reaction of the tissue attacked by them.

Field exposures over 20 minutes have been found to produce decrease in the viscosity in colloids in human serum and produces changes

in surface tension. Toxicity was found much lowered when diphtheria toxins were exposed to condenser fields. Phagocytic power of the leucocytes was influenced by the condenser field, with a moderate dose, phagocytosis was greatly stimulated and the phagocytic index increased. In the living body there is an increase of the antitoxin formation by ultra-short-wave treatment. A 15-metre wave reduces the blood pressure. Some asthmatics react excellently to 12 metres while some others show improvement only with 4-metre waves. In therapeutic measures the bacteria are not completely destroyed but their destruction is hastened by the improvement of protective powers and by the weakening of the bacteria themselves. Blood clotting is markedly increased by the treatment. A rise in cholesterol is noticed after irradiation of spleen. Radiation in the testis causes good spermatogenesis. Short-wave treatment lowers the tone of the sympathetic system and stimulates the parasympathetic system. A stronger heating is noticed in inflamed tissues. Even though Schereschewsky noticed a decline in the growth of inoculation sarcoma in rats, the treatment of malignant disease should go to the province of x-rays and radium and a distinct warning against any premature optimism regarding treatment by short waves in these cases should be given.

Treatment of human diseases

Ettingen and Schliepake, after a series of experiments on animals and on themselves for about two years, found that injuries occurred only after very heavy doses such as were given to small animals in powerful field concentrations. The well-known injuries due to x-rays were always in their minds. Pain occurred when certain field strengths were exceeded and generally between the occurrence of unpleasant sensation and the administration of a really injurious dosage there was found to be always a sufficiently long interval.

Technique.—The patient should be in a comfortable position. Changing should not involve much trouble. With modern apparatus, the secondary circuit with the electrodes can be easily applied to the patient in various positions. If lying, the patient should be placed on a steady table made of wood or some insulating material with as few metal parts as possible. The best underlay for the patient is rubber sponge. The patient should be as free as possible. It will be an advantage if the table is provided with rollers so that the patient can be easily adjusted by the side of the transmitter. In arranging the electrodes it is important to see that they are made fast in the correct position and the right distance from the body. The body must be held as firmly as possible between the plates.

Results of treatment

Furuncles.—The first case treated and cured was an extremely painful furuncle on the nose

of Schliepake himself in March 1929 at the medical clinic of Jena. The seat of trouble was close to the point of the nose and the condenser plates were each of a diameter of 5 cm. and were placed on either side of the affected part at a distance of about 5 mm. The treatment was continued for about 5 minutes by which time the very unpleasant sensation of tension and pain disappeared. The following day the furuncle was much smaller and by the second day it was completely absorbed. In 500 cases of furuncles treated by Schliepake there was only one failure and that was due to the patient not following the instructions but continuing his own treatment with the application of ointments, etc. These included furuncles in all stages of development.

The electrodes applied must be at least as large as the inflamed area. It is generally advisable to use 10 cm. electrodes. For a single treatment 10 to 15 minutes is as a rule sufficient. The effect of waves under 6 cm. is the best. One sitting per day is enough. The average time required for a complete cure of the furuncle was 4 to 6 days. The majority of simple furuncles take only 2 to 3 days.

I treated two cases of furuncles and both were cured in 4 days. Time used was 10 minutes. Case 1 had a bad furuncle in the nose with cellulitis all around and was sent to me by the E. N. T. Surgeon for infra-red therapy. He was given ultra-short-wave therapy instead. The patient was in great distress and on the first day he was given a sitting for 10 minutes. The pain was greatly relieved on the first day itself but swelling persisted for two days more. On the fourth day the swelling completely disappeared and there was no sign of the furuncle.

Whitlows and paronychia.—In these groups of cases the treatment is simple for the finger is just placed in between the two condenser plates, the treatment lasting for about 20 to 30 minutes. Schliepake had treated cases in all stages of the disease. None of the cases required surgical intervention. Recently two cases were treated by me by ultra-short-wave. Case 1, a nurse, had injured her index finger while closing a door which rapidly developed into tenosynovitis and lymphangitis. The finger and the corresponding part of the hand were infiltrated with pus. There was great relief of pain after the first day's treatment and the swelling also subsided to a very great extent. The condition completely cleared up after treatment for two more days.

Carbuncles.—Schliepake had treated carbuncles of various sizes with good results in all the cases. The treatment adopted was more or less the same as that adopted for furuncles excepting for the fact that each sitting was of half an hour's duration with 6-metre waves. In very large carbuncles it took 2 to 3 weeks.

Hidradenitis.—The results are good in the treatment of abscesses of the axilla. Sitzings of 20 minutes' duration a day were enough and

most of the cases were cured in four sittings, the longest being 8 sittings.

Dental diseases.—In dental and oral diseases (as dental sinus, root abscess, gingivitis, stomatitis, etc.) the treatment is best carried out by placing a 10 cm. plate on each side of the face. The duration of the treatment varies from 10 to 30 minutes depending on the nature and severity of the disease. According to Heisse, gingivitis and stomatitis in 75 specially long cases were cured after 6 to 8 radiations. Osteomyelitis of the jaw is dealt with especially in children. The discharge from the sinus almost always increases at first and the extrusion of the sequestrum and drying up of the sinus follow.

Empyema of nasal sinus.—Especially in the treatment of empyema of Highmore's antrum 10 cm. plates are best placed laterally on each cheek so that the eye does not come into the line of fire between the electrodes. The distance of the plates is 3 cm. being less on the affected side— $\frac{1}{2}$ to 2 cm. with 3 to 6-metre waves. Acute and sub-acute cases react very quickly. Usually there is an increase in the headache and fatigue after the first application or two, but this is relieved after three sittings.

Catarrh of the upper air passages.—The effects of short wave on catarrhal diseases are singular. With colds all the symptoms completely disappear the day after the treatment and often in 2 or 3 hours. The results are also very satisfactory in cases of laryngitis and tonsillitis.

Arthritic or joint diseases and lumbago (fibrositis).—A thorough examination of the case has to be made and decision arrived at as to whether a local treatment would suffice and if so when it should be applied. The deciding factor in these cases is to find out whether one is dealing with a disease which is self-limited or has a focal infection elsewhere. If the latter, the treatment must first be applied to the focus and subsequently to the diseased organ. The treatment at each sitting lasts from 10 to 20 minutes and the energy should be sufficient to produce a great feeling of warmth. The course in individual cases varies. Sometimes the pain which disappears for several hours after the first sitting returns. Large effusions have been absorbed after five or six sittings. In muscular rheumatism, relief often comes with dramatic suddenness. In the four cases treated by me (cases of arthritis), all were relieved of their pain and were able to use their affected joint actively. In one case of a lady lecturer, aged 32 years, there was great pain and the patient was unable to use her left hip joint. She had lightning pains in her cervical vertebral region. She was bedridden and the history went back as far as twelve years. Radiographs did not reveal any definite bony lesion excepting a slight narrowing of the joint spaces. She has had fifteen sittings of ultra-short-wave therapy of 10 minutes each to her left hip joint and cervical region. She has at present no pain, sleeps well and can freely use her left hip joint

and move her neck without any pain or discomfort. She is still continuing her treatment.

Abdominal diseases.—Chronic appendicitis and adhesions in the abdomen due to previous peritonitis or pelvic cellulitis are the types of cases which are admirably suited for ultra-short-wave therapy.

A 30-year-old girl who had pain in the lower abdomen with marked tenderness in the right iliac region accompanied by dyspepsia and emaciation was given fourteen sittings of ultra-short-wave therapy to the lower abdomen, each sitting being of 15 minutes' duration. This completely relieved her condition.

Gynaecological cases.—Diseases of the adnexa are very suitable for ultra-short-wave therapy. Two cases were treated by me and both have completely recovered. One case, a nurse, was frequently getting attacks of salpingitis and on the last occasion the pain was so intense that she fainted. She was given ten sittings of 10 minutes each, which resolved the condition completely. She has had no further attacks for the last four months.

Lung diseases.—The treatment of focal lung disease by ultra-short-wave therapy is very promising. With local foci we have very favourable dielectric conditions. As the lung tissue is full of air, dielectric losses must be comparatively less than in compact masses of tissues. The removal of the heat which is only produced in the interalveolar septi is very greatly facilitated by the freely circulating large quantities of blood in the lungs. It is therefore possible to use very powerful energies without fear of injury to the lung tissue (healthy).

Mode of treatment.—Plates of a diameter of 20 cm. are placed in front and behind the diseased side of the patient. This can also be done with the patient lying on his side or back, and in the latter case one of the electrodes can be placed under the table. There is no absolute standard for the strength of the condenser field. Generally, the strength is so adjusted that the patient feels a pleasant warmth in the inside of his chest. To start with the sittings can be of 10 minutes' duration with medium energy. The patient must be under observation and the treatment can be increased up to 20 minutes. If the patient gets a feeling of increased pressure inside his chest with mild dyspnoea setting in about 2 to 3 hours after treatment, as a result of pulmonary hyperæmia, the field strength and the duration of each sitting should on no account be increased further. I have had no experience of acute pneumonia being treated with ultra-short-waves but in my hands chronic unresolved pneumonias and abscesses of the lungs have responded favourably. Cases of bronchiectasis also give good results provided they are not too far advanced.

Case 1.—N., aged 40, had an attack of pneumonic involving the upper and mid-zones of the right lung field. He was treated by a

private medical practitioner for about a month. It is said that all available remedies including sulphonamides were tried to no purpose. The temperature ranged between 100° and 101°F. with cough and expectoration. Repeated examination of the sputum did not reveal any Koch's bacillus. In this condition he was admitted to hospital on 29th May, 1946, and sent for ultra-short-wave therapy. An x-ray photograph was taken which showed opacity at the upper and mid-zones (see figure 1, plate XIV). His pulse rate and temperature were 110 per minute and 101°F., respectively. On the first day ultra-short-wave therapy was given for 10 minutes, the condenser plates being placed in front and behind the affected side of the chest. Next day the time was increased to 15 minutes. On the third day the temperature touched normal. After 20 sittings the patient was discharged cured, subsequent radiographs showing the pneumonic patches completely cleared up (see figure 2, plate XIV).

Case 2.—C., a boy, aged 10 years, was treated for unresolved pneumonia at the right base for 10 days with a 10 minutes' sitting per day. The pneumonic area completely cleared up and he was discharged cured. But two weeks later the patient was reported to have died of some unknown cause.

Case 3.—A., aged 49, was sent for ultra-short-wave treatment with a history of cough for two months bringing forth foul-smelling sputum. On percussion there was a resonant area in the upper one-third of the right lung and on auscultation amphoric breathing with a few crepitations was heard over this area. Sputum was negative for Koch's bacilli but showed pus cells. A radiograph of the chest was taken which showed a thick-walled cavity with a fluid level on the upper zone of the right lung field with consolidation around (see figure 3, plate XIV). This confirmed the diagnosis of abscess of the lung. His temperature was 101.5°F. Ultra-short-wave therapy was given to the upper half of the right lung field, starting with a sitting of 10 minutes' duration for the first day. It was increased to 15 minutes on the second day. The temperature touched normal on the 4th day. The patient became more and more cheerful and altogether twenty sittings of 15 minutes each were given to him. A radiograph taken on the 20th day showed that the pneumonic area around the cavity had cleared up, there was no fluid level within the cavity and the cavity walls were very thin and disappearing (see figure 4, plate XIV). The patient discontinued treatment even though he was advised to continue it.

Diseases of the pleura.—Pleurisy with effusion, pleural empyema and dry pleurisy respond very favourably to ultra-short-wave therapy. Two cases of pleurisy with effusion were treated by me—Munuswamy and Ahmed Khan. They were both given ultra-short-wave sittings for 15 days with 15 minutes' duration per day. In both

cases the results were good, the effusions were practically absorbed.

Two cases of dry pleurisy. Ahmed Khan and Raju were given 14 and 25 sittings respectively of ultra-short-wave for 10 minutes at each sitting. In both cases the results were good. The case of Raju is interesting.

Raju, aged 35 years, male, Hindu, police constable by profession.

Complaint.—Cough with sometimes blood-stained sputum for the last three months and with pain on the left side for the last one week. He was admitted into the Pentland Ward on 6th May, 1946. X-ray of the chest showed diffused irregular opacity in the base and lower zones of the left lung field (see figure 5, plate XIV).

Urine.—No albumin nor sugar.

Respiratory system.—Movement of the left side of the chest is less than that of the right. Breath sounds much diminished at the left base with tenderness on percussion over this area.

Heart.—Nil abnormal.

Liver and spleen.—Not palpable.

About ten days of intensive medical treatment did not give any relief to the pain and so he was sent for ultra-short-wave therapy. He was given sittings of 10 minutes' duration for 25 days when the opacity at the left base cleared up and the pain disappeared (see figure 6, plate XIV).

Osteomyelitis, erysipelas, chronic eczema of the skin, diseases of the eye as abscesses of the lids, phlegmons of the lachrymal sac, inflammations of the orbit with ophthalmos and ulcus serpens are all supposed to respond very favourably to ultra-short-wave therapy according to Schliepake. Short ultra-wave therapy has come to stay and has a definite place in modern medical practice. In the hands of an expert it is a powerful weapon in the fight against disease. As is always the case in therapy of this kind it is the man behind the machine that is more important than the machine itself and it will be a real boon to suffering mankind only if it is used by experts, that is, by those who know how to use it.

I thank Rao Bahadur Capt. M. G. Kini, M.C., F.R.C.S., M.Ch. (Ortho.), etc., Superintendent, Government Stanley Hospital, Madras, for his invaluable help and encouragement.

EXPLANATION OF PLATE XIV

Fig. 1.—A case of unresolved pneumonia on the upper and mid-zones of the right lung field. Before treatment.

Fig. 2.—Same case as figure 1. After ultra-short-wave therapy.

Fig. 3.—A case of abscess of the lung—right upper and mid-zones. Before ultra-short-wave therapy.

Fig. 4.—Same case as figure 3. After treatment.

Fig. 5.—A case of thickened pleura base of the left lung field. Before treatment.

Fig. 6.—Same case as figure 5. After ultra-short-wave therapy.

AN UNUSUAL PHENOMENON IN STRYCHNINE CONVULSIONS

By A. M. J. SHIRAZI, M.Sc., M.B., B.S.

IN the Pharmacology Department, Stanley Medical College, Madras, it was considered worth while to test the margin of safety claimed by the British Pharmacopœia for the maximum dose of some of the toxic drugs; amongst the many toxic substances that suggested themselves, strychnine was considered the safest, as the antidote is well known and its action almost quantitative. After consideration of all factors it was considered reasonable that I personally should become the subject of study since it would be advantageous from the point of view noting the symptoms and signs, their order of occurrence and their relative severity.

The train of symptoms and signs of strychnine poisoning are very well described in textbooks of pharmacology (Sollmann, 1942). It is stated that, with 6 to 7 mg. in man, tautness of muscles and twitchings occur; and that with toxic doses, convulsions and other phenomena appear. The British Pharmacopœia maximum dose is well below the toxic dose, and therefore it was considered safe to take the maximum B. P. dose + 25 per cent; as a safeguard it was proposed to keep ready an ampoule of any one of the barbiturates, so that if the train of untoward symptoms set in it may be administered.

With the above object in view a capsule was filled with 10 mg. of strychnine hydrochloride (pure quality recrystallized) and swallowed at 7.45 p.m. By oversight the ampoule of sodium amytal was left behind in the laboratory, and at 8.45 p.m., while I was at dinner, the following symptoms and signs of toxicity were observed.

They began with short sudden attacks of a peculiar sensation in the throat which was not exactly painful nor choking but a combination of both, specially when the mouth was opened. Within about three minutes the act of swallowing was slightly painful, and the masseters were felt to be taut. In another minute or two attacks of dizziness affecting both the eyes were observed. These were very transitory in the beginning, but were soon replaced by more lasting but interrupted attacks, occurring at intervals of a minute or thereabouts.

Till now the other voluntary muscles had not been involved; but from now on (that is, from about ten minutes from the onset of the symptoms) these began to twitch and then became taut one by one, and within five minutes all voluntary muscles had been involved. The first group of muscles were those of the neck which became taut. It was then observed that the elbow could not be extended easily to lift a spoon because of the hypertonicity of the flexors. I got up from my seat and walked to the bed. While walking it was observed

that there was a tingling sensation in the soles of the feet and the extensors were felt to be taut. After a few paces I found it necessary to drag the feet as the flexion at the knee gave rise to tremors in both of the antagonistic groups of thigh muscles. There were no more attacks of dizziness, but the room appeared to be dim. In the eyelids I could feel the orbicularis oculi contracting in rings. While I was lying in the bed and waiting for the doctor, a number of reflexes were tried as the body lay in the 'bear' position, the elbows flexed over the chest, and also the wrists; the thighs extended, adducted, and internally rotated, the knee and ankle joints extended, with plantar flexion of the great toe. A sudden stimulus of light, sound or touch gave rise to an exaggeration of the position of the lower limbs, while the upper limbs went into athetoid movements at the elbows and twitchings of the muscles of the forearm and the fingers. A continuous non-varying stimulus had no effect. There was one constant feature throughout, namely, that with determination it was possible to inhibit a response to a stimulus. For instance an attack was expected when an injection of apomorphine was given an hour and a half after swallowing the drug (the attending physician's suggestion; in my opinion this was too late), but while vomiting it was possible to inhibit to a considerable extent the convulsions. Moreover, deliberate movements such as deep breathing, forced yawning were tried to note if an acute attack would be precipitated, and the diaphragm would contract. This did not occur.

During this period there were attacks followed by periods of rest. The rest did not consist of complete relaxation, but of a definitely more comfortable state than that of convulsions, the body still being in the 'bear' position.

I was removed to the General Hospital Outpatients Department, and there, while waiting for the sodium amytal ampoule from the dispensary, a sudden and complete relaxation of all the muscles took place so as to permit free movements at all joints, the 'rings' that were felt in the eyelids disappeared, and the vision became normal. I tried to get out of the stretcher, but the housemen would not let me do so and insisted on the sodium amytal being administered. Three minutes later, the barbiturate was administered subcutaneously, but there was no difference whatsoever between the state prior to and after the injection. This last phenomenon of sudden and complete relaxation was permanent; it seems to be unusual and does not seem to have been recorded in the literature. I have failed to find any reference in the available books, and hence the paper.

Discussion

Dose.—It has been reported (Sollmann, 1942) that 5 to 10 mg. may produce convulsions

and that with 20 to 30 mg. they definitely occur. The British Pharmacopœia's maximum dose is $1/8$ grain or 8 mg. The dose administered was only 25 per cent more than this maximum dose, and the British Pharmacopœia claims a greater margin with toxic substances. However, 10 mg. seems to be sufficient to produce convulsions; the convulsive dose for a frog is 0.75 mg./kg., and that for man is $1/6$ of that for frogs (both convulsive and fatal), that is 0.125 mg./kg. In this particular case the convulsive dose seems to be 0.1 mg./kg., and most probably this explains why untoward symptoms and signs such as involvement of the diaphragm and cyanosis did not take place. Therefore, the British Pharmacopœia's maximum therapeutic dose may be well below the toxic limits, but the margin of safety is not very wide.

Symptoms and signs.—The peculiar sensation in the throat is not mentioned in the available literature; this was the first thing to attract my attention; of course, there have been descriptions of a 'mechanical cry' in the literature. It cannot be explained by fixation of the cords of adduction or abduction; I did not find any change in my voice with all the acuity of hearing that I possessed, neither could those surrounding me appreciate any.

Secondly, there seemed to be an order of involvement of the voluntary muscles, in addition to the order in which the special senses were involved; that is if the peculiar sensation in the throat and dizziness is considered an involvement. The order of involvement of the voluntary muscles was the masseters, the neck muscles, the arm muscles and then the leg muscles.

Thirdly, the position of the limbs described in the literature and above was the 'bear position'; it is known that this is the position of the body after decerebration. There is no doubt that there is a response to a sudden stimulus and not to a continuous one, as with any other physiological reflex. Cushny (1920) considered the response to be a homologue of the start reflex. The 'start reflex' is considered a protective one, and hence there will be a flexor tone rather than an extensor one. The cerebral inhibition over the muscles seems to be removed. Sollmann mentions that in patients suffering from cerebral lesions, the paralysed muscles are the first to be involved after strychnine administration. This further supports the above contention; the group of muscles without the cortical inhibition become relatively hyperactive.

Fourthly, it is a fact that the Sherrington's reciprocal inhibition is lost, and hence the simultaneous contractions in the antagonistic groups of muscles, but this is only after the body assumes the 'bear position'. It is in this position that one observes the fact that the antagonists are not reciprocally relaxing, thus causing tremors and athetoid movements; but

this does not explain why the upper limbs occupied this position of flexion, or why the lower limbs took up a position of extension, adduction and internal rotation. The position of the body and the absence of Sherrington's reciprocal inhibition indicate that the inhibitory control of the cortex, as well as that of the cord, is lost. Hence it is an abolition of the inhibitory reflexes of the central nervous system but not including the autonomic.

The only unusual phenomenon was the sudden release of all the muscles from their position and tone before administration of barbiturates. A reference to this I have failed to find in the available literature.

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EVALUATION OF PROTHROMBIN RESPONSE TO VITAMIN K AS LIVER FUNCTION TEST

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THE prothrombin of the blood is elaborated in the liver. Andrus *et al.* (1939), and Warren and Rhoads (1939) produced experimental evidence in support of this hypothesis. By total and partial hepatectomy in animals they produced a profound reduction in plasma prothrombin concentration which was unaffected by treatment with vitamin K and bile salts. It has been found essential to have vitamin K for the production of prothrombin, the level of which falls in subjects with vitamin K deficiency. The exact rôle which vitamin K plays in the formation of prothrombin is yet to be decided. Is it a necessary constituent of prothrombin or does it act as a stimulus to the liver for the formation of prothrombin? Evidence is against the former contention, since pure prothrombin preparations do not have a naphthaquinone structure. Quick (1943) described prothrombin as composed of calcium and two separate components, one of which is stable and is probably related to the oxidation-reduction systems of the blood, and the other is heat labile and inactivated by decumarol.

Bile is essential for the proper absorption of natural vitamin K. Synthetic vitamin K analogues, particularly those which are water soluble, do not need bile salts for their absorption, if given in adequate doses. It is not certain as to the exact place of absorption from the bowel. Butt and Snell (1941) believe that it is absorbed through the upper part of small intestine. Javert and Macri (1941) mention that mineral oils taken internally inhibit the absorption of vitamin K. They dissolve vitamin K, and not being absorbed, are voided

with faeces, taking with them the vitamin K. Liver acts as a store-house for vitamin K though only small amounts are stored. Increased prothrombin time may be due to inadequate intake of vitamin K or the failure to absorb this fat soluble vitamin, specially in the absence of bile which is necessary for the absorption of fats (Wilson, 1940). The prothrombin response to vitamin K has been claimed to be highly sensitive test of liver function, since the hypoprothrombinæmia associated with severe liver damage does not respond to vitamin K therapy. Lucia and Aggeler (1941) disclaimed this view pointing that although hypoprothrombinæmia in cases of acute diseases of liver did not respond well to vitamin K there was no significant correlation between the hippuric acid excretion and plasma prothrombin either before or after administration of vitamin K. The findings of Kark *et al.* (1941) also support this view. However, it is an accepted fact that in acute and chronic affections of liver, there is generally an initial prothrombopenia which is not corrected appreciably after the administration of vitamin K. It is also helpful in differentiating obstructive from intrahepatic jaundice as in the former the prothrombin time usually returns towards normal following the administration of the vitamin K (Simmons and Gentzkow, 1944). Lord and Andrus (1941) found that there was a rise of from 10 to 62 per cent in the plasma prothrombin following intramuscular injection of 2-methyl-1:4-naphthaquinone in extrahepatic jaundice (common duct stricture, cholangitis, carcinoma of the head of the pancreas, etc.), while in cases of intrahepatic jaundice the response was 10 per cent or less. Kark and Souter (1941) also came to the conclusion that in patients with intense jaundice the return of low prothrombin level to normal after vitamin K therapy is in favour of a diagnosis of obstructive extrahepatic jaundice.

The observations noted in this paper are a result of my studies to correlate the hepatic function tests with liver biopsy findings. During these studies which included all types of liver affections, it became obvious that all such cases had hypoprothrombinæmia, which showed a varying response to parenteral administration of vitamin K. To correctly evaluate the response to vitamin K, hippuric acid synthesis test was done in all cases. In all these cases histological examination of the needle biopsy material was also done to correctly diagnose the nature of liver involvement.

The vitamin used in the work was 2-methyl-1:4-naphthaquinone (Menaphthone B.P.)-Prokayvit, (B.D.H.) in doses of 10 mg. injections intramuscularly. The prothrombin time was determined before and after 24 hours of injection of vitamin K. The method used was the modified technique of Iyengar *et al.* (1942). Hippuric acid test was done by the intravenous technique of Quick. Liver biopsy was performed with the Vim-Silverman needle (Wahi, 1946).

Thirty cases of liver disease have been investigated. Among these cases were patients of portal and biliary cirrhosis, malignant growths of liver, subacute hepatitis, amyloidosis and reticulo-endotheliosis of liver, jaundice and congestive heart failure. In all these cases plasma prothrombin level before and after administration of vitamin K and hippuric acid excretion was determined. The results are charted in the table.

Discussion

From the detailed analysis of the above cases, some interesting conclusions can be derived. Cases 2, 6 and 18 had jaundice, as the presenting symptom. They all had marked hypoprothrombinemia; but on the administration of synthetic vitamin K, they showed a very good response. This implies that these cases had no gross liver parenchymatous

TABLE

Comparative studies of response to vitamin K and hippuric acid in patients with liver disease

Case	Clinical diagnosis	Liver biopsy findings	Initial prothrombin concentration, per cent	Prothrombin concentration after vitamin K, per cent	Hippuric acid, g.
1. R. S.	Cirrhosis of liver with jaundice.	Portal cirrhosis	50	50	0.46
2. C.	Cancer of liver with jaundice.	Extrahepatic biliary obstruction.	40	88	0.25
3. O. P.	Cirrhosis of liver with jaundice.	Portal cirrhosis	66	70	0.28
4. M.	Chronic malaria with jaundice.	Do.	59	64	0.28
5. D. D.	Cancer of liver with jaundice.	Adenocarcinoma of liver	53	66	0.4
6. C.	Subacute hepatitis with jaundice.	Extrahepatic jaundice	44	94	0.39
7. P. S.	Pulmonary tuberculosis with enlarged liver.	Amyloidosis of liver	61	76	0.7
8. T. S.	Cancer of liver with jaundice.	Adenocarcinoma of liver	70	75	0.43
9. R. S.	Amoebic hepatitis with jaundice.	Biliary cirrhosis	40	45	0.46
10. R. L.	Endemic ascites with jaundice.	Portal cirrhosis	27	35	0.38
11. M.	Cancer of liver	Adenocarcinoma of liver	62	70	0.17
12. D.	Malarial cirrhosis	Reticulo-endotheliosis	84	100	0.9
13. S. S.	Endemic ascites. Cirrhosis of liver?	Normal liver histology	87	98	0.84
14. S. D.	Amoebic hepatitis	Portal cirrhosis	56	68	0.33
15. L.	Ascites. Cirrhosis of liver?	Tuberculosis of liver and tubercular peritonitis.	53	64	0.5
16. N. K.	Chronic malaria	Reticulo-endotheliosis	56	80	0.6
17. D. J.	Hepatomegaly	Diffuse metastatic carcinoma of liver.	38	50	0.49
18. S. D.	Cancer of liver and jaundice.	Adenocarcinoma of liver	60	100	0.5
19. L.	Amoebic hepatitis	Subacute hepatitis	82	85	0.6
20. R. K.	Right heart failure	Dilatation of sinusoids and cloudy swelling of cells.	40	67	0.54
21. B.	Do.	Do.	35	78	0.4
22. M. D.	Congestive heart failure	Dilatation of sinusoids and fatty degeneration of liver cells.	52	68	0.64
23. P. L.	Chronic bronchitis and right heart failure.	Biopsy not done	52	70	0.39
24. R. L.	Pulmonary tuberculosis with fibrosis and heart failure.	Fibrotic changes present in the liver.	22	28	0.55
25. B. R.	Chronic bronchitis, emphysema and right heart failure.	Do.	36	47	0.22
26. M.	Right heart failure	Patches of necrosis and fibrosis.	44	49	0.52
27. P.	Early congestive failure	Dilatation of capillaries only	67	76	0.42
28. C.	Congestive heart failure	Nutmeg liver	40	70	0.6
29. R. S.	Do.	Dilatation of capillaries, fatty degeneration of cells and patches of necrosis.	40	55	0.3
30. K.	Do.	Do.	40	50	0.35

lesion and the low prothrombin level was therefore not due to failure of formation of prothrombin, but to failure of absorption from bowel due to absence of bile. With the administration of synthetic vitamin K (which does not require bile for its absorption) the prothrombin level went up. The jaundice was therefore obstructive in type. This was confirmed by the liver biopsy findings. Jaundice in case 18 was probably due to obstruction of the common bile duct at the porta hepatis. These cases conform to group I of Kark and Souter (1941).

Cases 1, 3, 5, 8, 9 and 10 also had jaundice and initial hypoprothrombinæmia. But the response to vitamin K was poor and prothrombin level never reached normal. This group of jaundiced cases had chronic parenchymatous lesion of the liver of long standing. This is confirmed by the histological findings of the biopsy material from the liver. Hypoprothrombinæmia was due to non-formation of prothrombin and not to deficient supply of vitamin K. These two different types of response to vitamin K therapy in cases of jaundice thus help to differentiate between obstructive jaundice and jaundice due to parenchymatous lesion. This, I think, is the greatest use of this test.

Another group of cases (20, 21, 22, 23, 27 and 28), clinically diagnosed as congestive heart failure and histologically showing dilatation of capillaries, cloudy swelling and fatty degeneration of liver cells, showed marked initial prothrombinopænia, but the vitamin K response was good, though the prothrombin level never reached normal figures. These cases had parenchymatous liver damage of a moderate degree. The hypoprothrombinæmia was due to pressure on the interhepatic biliary ducts by the swollen cells and dilated capillaries, leading to diminished flow of bile and consequent diminished absorption of vitamin K from bowel. Besides due to moderate degree of parenchymatous lesion (cloudy swelling and fatty degeneration in the cells) there was also deficient production of prothrombin; and hence after the administration of synthetic vitamin K the prothrombin level never reached normal range. These cases correspond to group II of Kark and Souter (1941). When such cases (24, 25, 26, 29 and 30) develop chronic hepatitis (as shown by patches of necrosis and fibrosis), they show very poor response to vitamin K. The vitamin K response test may be useful to the cardiologist in finding the possibility of enlarged liver of heart failure, returning to normal. Cases with poor response where level of prothrombin fluctuates within certain subnormal limits irrespective of vitamin K administration show that the patient is developing cardiac cirrhosis and the liver will not return to its normal size.

Cases 1, 3, 4, 9, 10, 11, 14 and 17 had initial prothrombinopænia which did not appreciably respond to vitamin K; the final level of prothrombin always remaining subnormal. These

are the cases of chronic and long-standing liver affection; where liver cells were markedly damaged resulting in deficient formation of prothrombin (group IV of Kark and Souter).

From these findings it is evident that initial hypoprothrombinæmia may be due either to defective formation of prothrombin in the liver or to defective absorption of vitamin K from bowel. In the latter cases administration of synthetic vitamin K will correct the initial hypoprothrombinæmia and raise the prothrombin level to normal. In the former cases the vitamin K therapy will not produce any appreciable change. The vitamin K response is thus of great use in differentiating between obstructive jaundice and one due to parenchymatous liver lesion. Besides, the reaction is also helpful in pointing out the presence or absence of liver damage when jaundice is not present. Cases 12 and 13 were both clinically diagnosed as cirrhosis liver. The prothrombin response to vitamin K was very good, the concentration reaching normal. This showed that liver was not damaged and this conclusion was confirmed by the liver biopsy findings, which showed the liver histology as normal. In contrast to this is case 10 which was diagnosed as endemic ascites (the underlying liver condition being doubtful), showed poor vitamin K response indicating liver damage. On liver biopsy it was found to be a case of portal cirrhosis.

In all these cases, hippuric acid excretion was also estimated and the table shows a comparative study of hippuric acid excretion and plasma prothrombin level. It is clear that in all the cases of liver disease (as proved by liver biopsy), the plasma prothrombin level determination before and after vitamin K therapy was as sensitive a test of liver dysfunction as hippuric acid excretion. But there is no correlation between the two in showing the extent of the liver damage.

Summary

Patients with liver damage show an initial hypoprothrombinemia and a poor response after vitamin K therapy.

In cases with intense jaundice there is a low level of plasma prothrombin. If after administration of vitamin K there is a rapid return of the prothrombin level to normal, the jaundice is likely to be obstructive, while if the response is poor, there is liver parenchymatous lesion present.

In the comparative study of cases, the vitamin K response has been found to be as good a test of liver damage as hippuric acid, but no correlation exists between the two in showing the extent of liver damage.

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PROGNOSTIC SIGNIFICANCE OF LEUCOCYTIC COUNT IN BUBONIC PLAGUE

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and

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THE leucocytic reaction and its significance from the prognostic point of view have been worked out in several infectious diseases, particularly in pneumonia in adults and children, and it has been recognized that in human beings a high leucocytic level during the course of pneumococcal infection is associated with a more favourable prognosis. Several workers, Middleton and Gibbon (1930), Meyer (1931) and Tilghman and Finland (1937), have found that a leucocytic count of between 15,000 to 35,000 cells is attended with a more favourable prognosis than either a leucopenia or a very high count of over 40,000 cells. We are not aware of any work on similar lines having been done in human plague infections so far and we, therefore, give in the present communication, an analysis of the leucocytic reaction observed in 446 cases of human bubonic plague and its relationship to incidence of septicæmia and mortality. An opportunity for this study occurred when the various drugs of the sulphonamide series were being tried in the field by the senior author with a view to assessing their curative value in the treatment of human bubonic plague. It was noticed during these trials that those cases which showed a leucocytic count of over 40,000 cells per c.mm., either on admission or during the course of the acute

phase of the disease, almost always headed towards a fatal termination. This suggested that the total leucocytic count may serve as a rough index of the severity of plague infection and possibly as a guide to prognosis in bubonic plague. We have, therefore, analysed the records of 446 cases in which the total leucocytic count was done on admission and thereafter on alternate days till the temperature came to normal, or the case terminated fatally. The results are recorded below. The cases include those of all ages and all grades of severity including those that died within 24 hours. At least two counts have been done in each case except those which died too early to permit of more than one count. Thus in 73 cases which died in 24 hours or so only one count was done, in 97 cases two counts were done and in the remaining 276 cases three counts were done. The highest count obtained was taken into account for purposes of analysis. Table I shows the relation of the total leucocytic count to mortality in these 446 cases.

TABLE I

Relation of the leucocytic count to mortality in 446 plague cases

Leucocytic count, thousands	Number of cases	Deaths	Mortality, per cent
Less than 5 ..	6	3	50.0
5 to 10 ..	79	14	17.7
10 to 20 ..	216	39	18.0
20 to 30 ..	70	37	52.8
30 to 40 ..	37	27	72.9
Over 40 ..	38	37	97.3

It will be seen that cases having a leucocytic count of below 5,000 had a mortality of 50.0 per cent, while the mortality was 17.0 to 18.0 per cent in cases showing a leucocytic response of 5,000 to 20,000 cells. With increasing leucocytic response, the mortality increased. In cases with a leucocytic count of over 40,000 cells per c.mm., the mortality was extremely high, that is, 97.3 per cent.

The main factor which determines the severity of plague infection and the probable outcome in any plague case is the absence or presence of septicæmia and its degree. To detect the presence or absence of septicæmia, 0.5 c.c. of blood was drawn from a vein of the patient on admission and spread in equal quantities on two agar slopes. The cultures were seen after incubating the slopes for two days at room temperature (27°C.). If the culture was negative the case was taken as non-septicæmic and in these cases the prognosis was favourable and the mortality very low. If the culture was positive the case was called 'septicæmic' and the number of colonies on the agar slopes were noted. In septicæmic cases the outlook was more grave. It was found in the various trials that it was not merely the

presence of septicaemia that influenced the final outcome in any particular case but also the degree of septicaemia present at the commencement of treatment. Cases that showed a mild degree of septicaemia (1 to 10 colonies in 0.25 c.c. of blood) had a much lower mortality than those that showed a severe degree of septicaemia, i.e. a colony count of more than 10 colonies in 0.25 c.c. of blood. The mortality rate obtained in human plague cases of different severities is given in table II.

leucocytic count of 5,000 to 10,000, out of 79 cases, 35 or 44.3 per cent were septicaemic and in group 3, with 10,000 to 20,000 leucocytes, out of 216 cases, 105 or 48.6 per cent showed septicaemia. The mortality corresponded to the proportion of septicaemic cases in each group except in the group where the count was less than 5,000 (see chart). In cases in which the leucocytic count was less than 5,000, the death-rate was higher in comparison to the incidence of septicaemia.

TABLE II
Percentage mortality in plague cases of different severities

Treatment	Non-septicaemic cases	Septicaemic cases	Mild septicaemic case 1-10 colonies in 0.25 c.c. blood	Severe septicaemic cases. More than 10 colonies in 0.25 c.c. blood
Pasteur and Lister Institute sera. Plague Commission (1912).	25.9	91.2	74.5	100.0
Haffkine Institute serum. Naidu and Mackie (1931).	15.0	52.1	12.5	73.3
Haffkine Institute serum. Sokhey and Wagle (1940-41).	1.1	50.7	24.1	69.0
Sulphonamides. Sokhey and Wagle. (1940-41).	5.2	39.3	16.2	50.5

If the 446 cases that form the subject matter of the paper alone are considered the mortality rate worked at 7.0 per cent in non-septicaemic, 54.9 per cent in septicaemic, 21.8 per cent in mild septicaemic and 65.8 per cent in severe septicaemic cases. It is evident from this that although the mortality in plague cases of different severities has been reduced as a result of improvements in treatment, it has always remained considerably higher in septicaemic than in non-septicaemic cases, and in severe septicaemic than in mild septicaemic cases.

If the cases are grouped according to their leucocytic response and classified into septicaemic and non-septicaemic (table III), it will be observed that with the increase in the level of the leucocytic count, the percentage of septicaemic cases in that group also increased (table III, last column). Thus in group 2 showing a

CHART

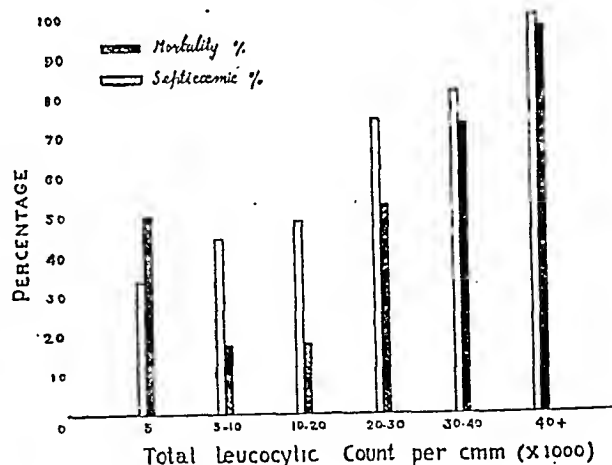


TABLE III
Leucocytic count and its relation to septicaemia and mortality

Group	Leucocytic count, thousands	SEPTICAEMIC CASES			NON-SEPTICAEMIC CASES			Percentage of septicaemic cases in the group
		Number of cases	Deaths	Mortality, per cent	Number of cases	Deaths	Mortality, per cent	
1	Less than 5	2	2	100.0	4	1	25.0	33.3
2	5 to 10 ..	35	13	37.1	44	1	2.2	44.3
3	10 to 20 ..	105	32	30.4	111	7	6.3	48.6
4	20 to 30 ..	52	36	69.2	18	1	5.6	74.2
5	30 to 40 ..	30	24	80.0	7	3	42.8	81.0
6	Over 40 ..	38	37	97.3	..	..	..	100.0

The higher the leucocytic count, therefore, the greater the chances of septicæmia, and higher the mortality. Cases with a leucocytic count of over 40,000 cells were all septicæmic and, therefore, the mortality in these cases was almost cent per cent.

If we classify the septicæmic cases with different leucocytic levels into those showing mild septicæmia and severe septicæmia and study the distribution of severe septicæmic cases (table IV), we find that as the level of the leucocytic count rose the percentage of the mild septicæmic cases in the group decreased, while that of the severe septicæmic cases increased with the resultant increase in mortality. Exceptions were found in the severe septicæmic cases of groups 2 and 1 in which the mortality was disproportionately higher to the incidence of severe septicæmic cases, that is, 68.7 per cent and 100.0 per cent, respectively. It was also seen that the 38 cases which showed a leucocytic response of over 40,000 cells per c.mm., were all of severe septicæmic type.

that in a virulent infection like that of severe septicæmic plague, presence of normal count of 5,000 to 10,000 cells indicates lack of resistance on the part of the patient and thus a condition analogous to leucopænia. In cases which show leucopænia, that is, a count below 5,000, there is no correlation between the count, the incidence of septicæmia and mortality, but the number of such cases, however, is very small.

Sulphonamides are known to produce a leukæmoid reaction or a leucopænic condition by their toxic action, but all cases suspected to be showing these conditions as a result of the toxicity of the drugs have been excluded from the present series.

Summary

1. Four hundred and forty-six cases of bubonic plague treated with sulphonamides have been analysed with respect to leucocytic response, the incidence and degree of septicæmia, and the mortality.

TABLE IV

Table showing relation of leucocytic count to septicæmic cases of different degrees

Group	Leucocytic count, thousands	TOTAL SEPTICÆMIC CASES			MILD SEPTICÆMIC CASES			SEVERE SEPTICÆMIC CASES		
		Number of cases	Deaths	Mortality, per cent	Number of cases	Deaths	Mortality, per cent	Number of cases	Deaths	Mortality, per cent
1	Less than 5	2	2	100.0	1 (50.0%)	1	100.0	1 (50.0%)	1	100.0
2	5 to 10 ..	35	13	37.1	19 *(54.3%)	2	10.5	16 *(45.7%)	11	68.7
3	10 to 20 ..	105	32	30.4	34 (32.4%)	6	17.6	71 (67.6%)	26	36.6
4	20 to 30 ..	52	36	69.2	9 (17.3%)	5	55.5	43 (82.7%)	31	72.0
5	30 to 40 ..	30	24	80.0	1 (3.3%)	0	0.0	29 (97.7%)	24	82.7
6	Over 40 ..	38	37	97.3	..	..	..	38 (100.0%)	37	97.3

* Figures show in what percentage the mild and severe septicæmic cases are present in the total septicæmic cases in the group.

It is thus evident that in all cases in which the patient reacts to infection and the count rises over 10,000 cells per c.mm., the leucocytic count bears a close relation not only to the incidence and degree of septicæmia but also to mortality. In cases which show no response to infection and the count lies between 5,000 to 10,000 cells, the incidence of septicæmic and severe septicæmic cases is very low, that is, 44.3 per cent and 45.7 per cent, respectively, and, therefore, the mortality is also low in all cases except the severe septicæmic cases of this group, viz, 17.7 per cent in all cases, 37.1 per cent in septicæmic cases, and 10.5 per cent in mild septicæmic cases. In severe septicæmic cases of this group, the mortality is comparatively higher, that is, 68.7 per cent, and it is probable

2. The outcome of a case of bubonic plague is decided by the incidence of septicæmia and its degree. It was noted that progressively increasing leucocytosis indicated progressively increasing incidence of septicæmia and its increasing severity and consequently increasing mortality. With a leucocytic count of over 40,000 cells, all the cases showed extreme septicæmia and mortality was highest.

3. In cases which did not show leucocytosis and the count was between 5,000 to 10,000 cells, the incidence of septicæmia was lowest and prognosis favourable, but when severe septicæmic cases occurred, prognosis was unfavourable.

4. In cases which showed leucopænia, the prognosis was not favourable.

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TROPICAL EOSINOPHILIA WITH MELÆNA AS COMPLICATION DURING ARSENICAL THERAPY

A CASE REPORT

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THE patient R. R., aged 23 years, employed as a peon, was admitted on 2nd April, 1946, complaining of severe attacks of nocturnal dyspnoea and low-grade fever which had supervened since 2 months and cough with expectoration which he had for the previous 2 years. He was born and brought up at Gorakhpur (U. P.) and when 15 years old came to Lahore and stayed here for 3 years. He then had no symptoms. From here he went to Bombay and worked there as a chowkidar for nearly 2½ years. In the latter half of this stay he started getting dry cough in the mornings, with occasional attacks of sore throat and fever. He had two or three such attacks lasting 3 to 4 days each time and went to his native district where he got better. On returning to Bombay 2 months later his complaints recurred and increased in severity and paroxysms of respiratory distress also supervened. He felt feverish in the evenings, lost appetite and grew weak. Finding himself worse, he decided after a month to come to Lahore, where he tried various treatments with no relief. Ultimately thinking that he was getting tuberculosis he sought admission to Sir Ganga Ram Hospital for treatment. In his childhood he had suffered from cutaneous eruptions which might have been eczematous, otherwise he has suffered from no allergic complaints or any other notable illness in the past. His parents, who are dead, had no asthmatic trouble, nor has any of the 3 elder brothers and one sister suffered from this type of ailment. On admission he looked slightly wasted and sallow. He was getting bouts of persistent dry cough with asthmatic attacks at night during which moderate amount of mucoid sputum was expectorated. He ran a low-grade temperature, round about 99.5°F., in

the evenings. The average pulse rate was 84 to 90 p.m. The throat showed mild infection and voice was slightly husky. The chest was slightly hyper-resonant in all areas and showed medium rhonchi in both phases of respiration all over with occasional non-resonant crepitations of medium type at the bases. The spleen was 2 fingers below the costal margin. No other abnormality could be detected. Examination of the blood revealed the following picture:—

Hb.	..	..	100%
Total R.B.C.	..	..	4,750,000
Total W.B.C.	..	..	25,200
Differential count—			
Polymorphs	..	..	18%
Lymphocytes	..	..	8%
Large mononuclears	..	..	1%
Eosinophils	..	..	73%

Repeated stool examination revealed no abnormality nor any cause of allergy. The sputum showed large number of eosinophils and was persistently negative for acid-fast bacilli. It was examined for mites but none could be found. Urine was normal. Kahn's test of the blood was negative. E.S.R. was 62 mm., 1st hour. X-ray examination of the lungs showed fine mottling in the upper and middle zones and lymphatic congestion. It did not reveal the classical appearances of 'eosinophilic lung'. However, a provisional diagnosis of 'tropical eosinophilia' was made and he was given the first injection of N.A.B. 0.15 g. on 5th April, 1946. In the evening his temperature rose to 101.4. There were no other symptoms or signs of intolerance of the drug. That night the asthmatic attack was very mild and passed off soon. Next morning he looked very comfortable. His temperature was normal and cough was better. On the night following he had no attack of asthma and this was the first night since 2 months that he had had no such attack and did not get it subsequently. On 9th April, 1946, at 5 p.m., the second dose of N.A.B. 0.3 g. was given in the evening. About 3 hours later he expectorated a little blood-tinged sputum in two or three bouts of cough. At midnight he passed a motion consisting of frank blood, and four more such motions up to the next morning, each fairly large in quantity. His temperature rose to 101. The pulse rate was 96 and volume feeble and the blood pressure was 110/75. The abdomen was moderately tender all over, particularly on the right side and was somewhat rigid on palpation. Lungs were clear. The stool contained frank blood and no faecal matter. Microscopically large numbers of red blood cells were present with proportionate W.B.C. and a few epithelial cells. During the day melæna continued and he passed 12 motions of similar type containing frank blood. Marked circulatory depression occurred and the patient had to be supported with intravenous salines and glucose injections. He was given sedatives to check restlessness. Blood was examined again. It

contained no malarial parasites, its coagulation and bleeding times were normal and so was the thrombocytic count. On the following night there was intense pain in the abdomen and slight relief followed a starch opium enema. On the 11th he had 31 small motions containing frank blood and none of them showed any evidence of inflammation of the bowel. The blood pressure fell to 100/65 and intravenous transfusions had to be repeated. On the 12th the condition took a favourable turn. Motions decreased in frequency and pain abated considerably. Gradual progress was maintained for the next 3 or 4 days and things returned to normal after about 6 days. The patient had 53 bloody motions in all. They directly followed the arsenical injection though no other symptom of intolerance was exhibited. Urine was free of albumin. However, the respiratory symptoms were completely relieved and all this while the patient had no asthmatic attack. His cough also abated and the chest became clear. Subsequent blood counts were as follows :—

16-4-46 ..	Total count 16,000.	Polymorphs 28%
		Lymphocytes 40%
		Eosinophils 32%
22-4-46 ..	..	Eosinophils 25%
27-4-46 ..	Total count 8,200.	Polymorphs 52%
		Lymphocytes 30%
		Eosinophils 18%

The patient was discharged on 29th April, 1946, and was instructed to report periodically, which he did. He kept completely free from respiratory symptoms for the following 6 months and did his work normally. During this period he had no abdominal symptoms, the chest and abdomen revealed no abnormality on examination and his blood counts were as follows :—

15-5-46 ..	Total count 9,600.	Eosinophils 13%
8-7-46 ..	Total count 10,200.	Eosinophils 12%

On 21st October, 1946, he got slight cough with expectoration which he attributed to taking bad ghee. There was no asthmatic attack. The chest showed a few medium-sized rhonchi. Blood counts were :—

Total W.B.C. ..	..	13,900
Differential count—		
Polymorphs ..	..	57%
Lymphocytes ..	..	10%
Large mononuclears ..	..	3%
Eosinophils ..	..	30%

An x-ray picture of the chest was again taken. It showed no abnormality. The patient was kept under observation and nothing was prescribed. The symptoms gradually abated and he kept free from them subsequently up to date.

On 9th December, 1946, he had slight cough, the chest was clear and the counts were as follows :—

Total W.B.C. ..	..	10,000
Eosinophils ..	..	18%

A check-up on 21st March, 1947, showed complete freedom from symptoms, no signs in the chest, no splenic enlargement, total leucocytes

8,500 per c.mm. and a differential count of polymorphonuclears 52 per cent, lymphocytes 36 per cent, large mononuclears 3 per cent, and eosinophils 9 per cent.

Discussion

The clinical features of this case including the paroxysms of expiratory dyspnoea with dry cough, low-grade fever, loss of weight, spasmodic signs in the lungs with a moderate enlargement of the spleen, moderate leucocytosis with high eosinophilia, *viz*, 73 per cent are highly suggestive of the presence of tropical eosinophilia. Even in the absence of typical radiological appearances, the dramatic response to arsenic confirms the diagnosis. The case exhibits a few points of interest.

Firstly, the severe hæmorrhagic complication which followed the second injection of 0.3 g. of N.A.B., 5 days later than the first dose of 0.15 g., deserves pointed attention. Slight hæmoptysis preceded the severe melæna which almost endangered the life of the patient and persisted for 3 days. This complication has not heretofore been recorded in such a frank form as it occurred in this case. Arsenic is a well-known endothelial poison and it has been observed that wall of the capillary is injured by arsphenamine as a result of which there occurs either diapedesis of blood cells through the vessel wall or frank hæmorrhage (Boyd, 1945). Hæmorrhagic encephalopathy and hæmorrhagic nephropathy have been described after its administration (Harrison, 1946). Colitis has also been observed. On post-mortem examination widespread ecchymosis and capillary hæmorrhages in all organs including the intestine have been noted. All the same such profuse melæna is not a common happening during arsenic therapy. Who has not given hundreds of N.A.B. injections to his syphilitic patients without noticing such frank hæmorrhages? This experience makes one wonder whether the eosinophilic condition had something to do with this profound hæmorrhagic reaction of the patient to a small dose of the arsenical.

Secondly, the complete amelioration of symptoms and stoppage of asthmatic attacks after the very first injection of arsenical should be noted. This patient received only 2 injections of N.A.B., first 0.15 g., and second after 5 days, 0.3 g. during April and except for a mild exacerbation in the month of October he kept completely free from symptoms in this period of one year. The leucocyte count had fallen to 8,000 with 18 per cent eosinophils nearly 3 weeks after the first injection. Eosinophils were 12 to 13 per cent in the subsequent 6 months. In October the total count rose to 13,900 with 30 per cent eosinophils and he had slight cough without any asthmatic attacks or temperature. No treatment was given and the condition settled of itself within a week's time. Eosinophils in December 1946 were 18 per cent and a check-up in March 1947 showed complete

freedom from symptoms, total leucocytes 8,500 with 9 per cent eosinophils. The usual course of arsenic suggested for the disease is 4 to 6 injections and subsidence of eosinophilia was observed by Weingarton (1943), Simeons (1943) and others after the 4th injection. This case, however, kept asymptomatic for 6 months after two small doses of N.A.B., and the slight recurrence subsided by itself. Subsequently the patient has been completely free from symptoms and eosinophilia has settled down to 9 per cent. Thus it will be observed that two small doses of N.A.B. were quite effective in checking the disease over this period of one year.

Thirdly, this case further supports the view that radiological changes in the lungs should not be insisted upon for a diagnosis of tropical eosinophilia.

Summary

In a case of tropical eosinophilia severe melæna has been reported as a complication during arsenical therapy. Follow-up of the case for one year showed that after two small doses of N.A.B. the disease was checked and no severe relapse occurred.

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HETEROZYGOUS Rh TRANSMISSION IN A LARGE FAMILY WITH A CASE OF ERYTHROBLASTOSIS FOETALIS

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A CASE of neonatal jaundice was referred to the writer on the 6th December, 1946, with the following history :—

The baby was born after an apparently normal pregnancy and labour on the 4th December, 1946, at 7-30 a.m. It was quite healthy and weighed 7½ lbs. A slight yellowish discoloration of the skin was noticed the same evening and by the next morning the jaundice was marked. An injection of mother's blood had been given. The death of the previous child from neonatal jaundice caused the prompt reference of the patient for investigation. This was the mother's third pregnancy. The first child was delivered by forceps and died within 15 minutes of delivery. The second pregnancy resulted in the birth of a full-term child in November 1945. The baby was healthy at birth and weighed 7 lbs. Jaundice appeared on the 2nd day and was complicated

by diarrhoea on the 4th day. The jaundice increased in severity and the infant died on the 9th day.

When the baby was first seen on the 6th December the skin was deeply jaundiced and shrunken, eyes tightly closed, lips and tongue somewhat dry, liver and spleen not palpable. The baby was dull and took the feeds poorly. The cry was feeble and hoarse.

Investigation.—Samples of blood were collected from the baby and its parents and from two brothers and four sisters of the mother. In addition the baby's hæmoglobin percentage was estimated and blood smears taken for examination.

The child's hæmoglobin was 80 per cent. The blood smear showed anisocytosis, poikilocytosis and polychromasia but no nucleated red blood cells. The blood belonged to group B and was Rh positive. The results of the blood grouping and Rh tests of the other members are shown below :—

	Blood group	Rh group (anti-Rh ₀ serum)
Father ..	O	Rh +
Mother ..	B	Rh -
Brother ..	B	Rh -
Brother ..	B	Rh +
Sister ..	B	Rh -
Sister ..	B	Rh -
Sister ..	B	Rh +
Sister ..	B	Rh +

Thus the father and baby were Rh positive and the mother Rh negative. The mother and child were of the same blood group B. The Rh heterospecificity of the mother and child was suggestive and so evidence for iso-immunization of the mother was looked for. The usual tests for Rh sensitization were done. For the test cells the five Rh positive bloods including the baby's were used, while the Rh negative bloods were utilized as negative controls.

The table shows the results of tests for Rh sensitization.

It will be seen that the three tests were positive against all the Rh positive bloods and negative against Rh negative bloods, thus demonstrating that the immune antibody in the mother's serum was an anti-Rh antibody. Chown's test was doubtful in one instance (no. 5) and this may probably be attributed to the test being performed with capillary tubes of unequal bore. It may be observed that the appearance of the pattern of the cell sediment in some of the tubes in the conglutination test suggested a positive test but on microscopical examination it was shown to be due to rouleaux formation.

Progress and treatment

7th December, 1946.—About 75 c.c. of blood from one of the Rh negative uncles were drawn in 10 c.c. of 3 per cent sodium citrate. The

TABLE
Tests for Rh sensitization

Test blood number	Source	Blood group	Rh test	RH SENSITIZATION TESTS			
				Diamond-Abelson test	Conglutination test (Wiener)	Chown's capillary tube test	
1	Father	O	Positive	+	+	+	Tested on 6th December, 1946. " " 6th " 1946. " " 6th " 1946. " " 6th " 1946. " " 6th " 1946. " " 6th " 1946. " " 6th " 1946. " " 6th " 1946. " " 6th " 1946. " " 14th " 1946. " " 14th " 1946. " " 14th " 1946. " " 14th " 1946. " " 14th " 1946.
2	Mother	B	Negative	—	—	—	
3	Brother (1)	B	"	—	—	—	
4	Brother (2)	B	Positive	+	+	+	
5	Sister (1)	B	"	+	+	±	
6	Sister (2)	B	"	+	+	+	
7	Sister (3)	B	Negative	—	—	—	
8	Sister (4)	B	"	—	—	—	
9	Baby	B	Positive	+	+	+	
10	Brother (3)	B	"	+	+	+	
11	Sister (5)	B	"	+	+	+	
12	Sister (6)	B	Negative	—	—	—	
13	Brother (4)	B	Positive	+	+	+	
14	Brother (5)	B	"	+	+	+	
15	Grandmother	B	"	+	+	+	

+ indicates presence of agglutination. — indicates absence of agglutination. ± indicates doubtful reaction.

blood was transfused through a scalp vein. After about 15 c.c. had run in, the flow of blood stopped, the needle probably having got displaced. Further attempts to needle a vein were unsuccessful. There was no reaction to the transfusion.

In spite of the small quantity of blood transfused the baby showed marked improvement. It looked brighter and took the feeds better. The jaundice cleared up within 4 or 5 days. The hæmoglobin level, however, continued to be at 80 per cent.

On the 14th December, 1946 (i.e. 10th day after delivery), samples of mother's serum and breast milk were titrated to determine the antibody content. The average titre of serum against five different group B Rh positive bloods was 16, while even neat breast milk failed to agglutinate the cells (Witebsky *et al.*, 1942 technique).

It was considered of interest to test the Rh group of the remaining brothers and sisters of the mother. Five, three brothers and two sisters, were available for study and only one of them was Rh negative. The grandmother, who was also tested, was group B Rh positive.

Further progress of the child

The general condition continued to be satisfactory and the hæmoglobin was maintained at 75 to 80 per cent. The baby had fever on the 19th and 20th (temperature 100° to 101°F.). The general condition deteriorated rapidly, the hæmoglobin dropping to 30 per cent and the R.B.C. count to 1.5 million per c.mm.

A transfusion of blood from the same Rh negative donor was attempted but only 10 c.c. could be given. A further transfusion of 40 c.c. was given on the following day. There was

marked improvement following the last transfusion. However, a blood smear taken for a study of the blood picture was reported to contain numerous B.T. malarial parasites and also nucleated red cells. There was also poikilocytosis, anisocytosis and polychromasia. The baby was promptly treated with quinine and apart from a persistent anæmia the child was otherwise well till 6th March, 1947, when last heard of. The hæmoglobin had risen to 60 per cent. Further blood transfusion was suggested but unfortunately refused.

Discussion

The first question that suggests itself is 'was it a case of congenital hæmolytic disease?' For an answer one has to take into consideration not merely the clinical picture and the hæmatological findings, but also the family history, the Rh group of the baby and its parents and the serological findings with the mother's blood.

The points in favour of the case being one of congenital hæmolytic disease are (Chown, 1944), history of death of the previous child from neonatal jaundice (Diamond and Abelson, 1945), Rh heterospecificity of the mother and baby (Polayes and Ohlbaum, 1945), presence of anti-Rh agglutinins in the mother's blood (Ranganathan *et al.*, 1946), their specificity to the baby's red cells (Wiener, 1945) and onset of jaundice on the day of birth and its progressive increase associated with anæmia. The points against are (Chown, 1944), absence of typical clinical features, enlargement of liver and spleen (Diamond and Abelson, 1945) and absence of nucleated red cells. It has to be remembered that the above are features of severe cases of erythroblastosis foetalis and that mild cases may not present the typical picture. Polayes and

Ohlbaum (1945) consider that in this disease marked polychromasia has the same significance as the nucleated red cells.

'Was blood transfusion indicated?' For an answer one could not do better than to quote Wiener (1946) who states that 'if an infant has congenital hæmolytic disease due to univalent Rh antibodies, the presence of a hæmoglobin concentration of 80 per cent is usually sufficient indication for transfusion.' If an infant has icterus gravis due to bivalent Rh antibodies (Rh agglutinins as in the present case), Wiener advocates completed exsanguination transfusion as the treatment of choice.

It is feared that malarial infection was transmitted to the baby by the blood transfusion. A careful inquiry later showed that the donor had had fever (malaria?) about 6 months previously. It is probable that the fever which the baby suffered from on the 19th and 20th, i.e. 12 days after the transfusion, was malarial and had a blood examination been done during the fever the diagnosis would have been made.

The donor in question was considered most suitable on account of his good general health and prominent arm veins. Thick blood smears taken from him on the 26th December showed no malarial parasites although the baby seems to have served as a culture medium to show up the latent malaria in him. The obvious lesson to be learnt is that donors with a history of malaria should not be accepted and that no reliance can be placed on the examination of the donor's blood to rule out malaria.

The case is of considerable interest from the genetic point of view. The grandmother is Rh positive and heterozygous (Rhrh). Twelve out of fourteen brothers and sisters were available for study and five of them including the baby patient's mother are Rh negative. The occurrence of no less than five Rh negative individuals in the same family is significant and helps to strengthen the impression that the seeming rarity of congenital hæmolytic disease in India is probably due to want of recognition rather than to lack of its occurrence. It also serves to illustrate another point emphasized by the author and his collaborators (1946) that the larger size of the average family in India may be expected to result in a larger number of affected children.

Lastly, attention may be drawn to the practice of giving the mother's whole blood to infants suffering from neonatal jaundice. That it is an improper treatment in cases of *erythroblastosis foetalis* will be appreciated from the fact that it is the maternal antibody which causes the disease and further injection of the mother's blood will only aggravate the condition.

Summary

(1) A case of heterozygous Rh Mendelian transmission in a large family with a case of congenital icterus gravis is reported.

(2) The accidental transmission of malaria by transfusion is recorded and the futility of examining blood smears to rule out malaria in donors is further confirmed.

(3) The possible danger of injecting the mother's blood indiscriminately to cases of neonatal jaundice is pointed out.

My thanks are due to Major M. H. Shah, I.M.S., Superintendent, Irwin Hospital, New Delhi, for affording facilities for investigation in the hospital laboratory and to Dr. Sher Singh, Pathologist to the hospital, for willing assistance and co-operation. My grateful thanks are due to Lieut.-General R. Hay, C.I.E., I.M.S., Director-General, Indian Medical Service, New Delhi, for permission to publish this article.

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A Mirror of Hospital Practice

LOBECTOMY FOR GIANT CYST OF THE LUNG

By B. R. BILLIMORIA, F.R.C.S.

(Consulting Surgeon, Bel-air Sanatorium; Honorary Surgeon, Masina Hospital, Bombay, late Assistant Surgeon, Harefield Thoracic Surgical Unit, England)

THE interesting features of the following case merit its publication:—

Olive C., aged 18, was admitted to hospital for investigation of progressive dyspnoea. An x-ray of the chest was taken and a diagnosis was made of a right spontaneous pneumothorax. Needling of the chest showed that the pressures were +8 +3. Two hundred c.c. of air were withdrawn and the pressures reached $\pm 0 - 4$. Five days later the pressure readings were again taken and found to be +2. Four hundred c.c. of air were withdrawn and the pressures reduced to $\pm 0 - 1$. Four days later the chest was again needled and pressures found to be +2 +6.

A diagnosis of a persistent spontaneous pneumothorax was made and the patient referred to the Harefield Thoracic Surgical Unit for further investigation.

On admission to Harefield she was found to have, clinically, the signs and symptoms of a right pressure pneumothorax. Radiologically (figure 1, plate XV) the appearances were more in favour of a balloon cyst of the lung.

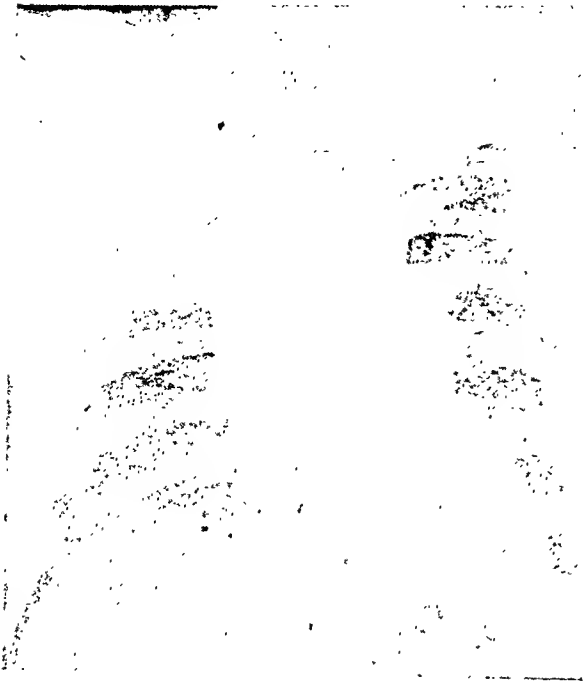


Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.

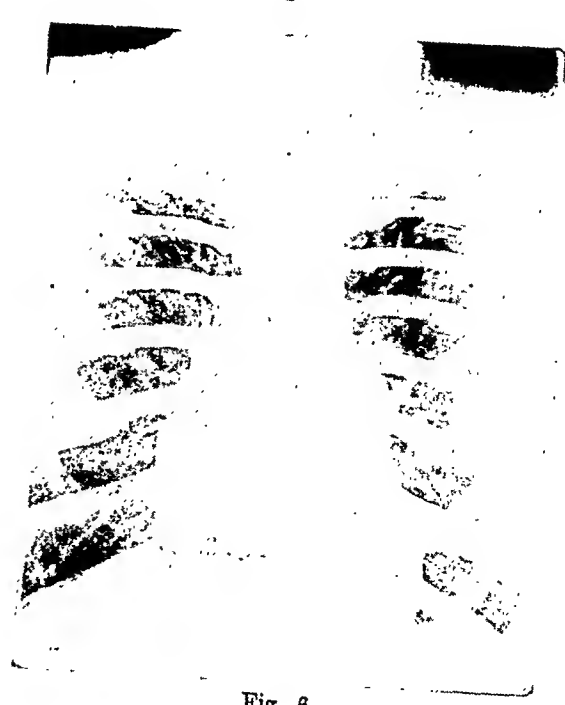


Fig. 6.



Fig. 1.



Fig. 2.



Fig. 3.

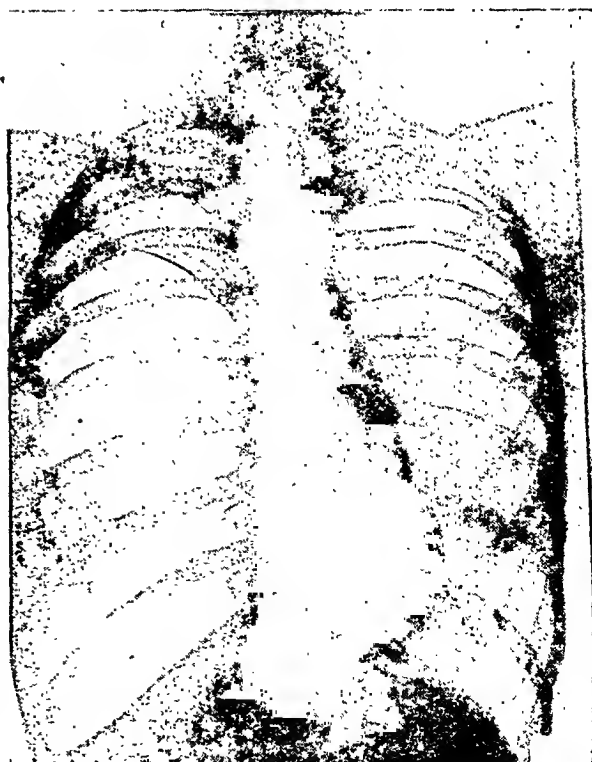


Fig. 4.

A bronchogram of both sides (figures 2, 3 and 4; plate XV) showed that no oil entered the cyst and on the left side there was no evidence of cyst formation and the bronchogram was normal apart from a slightly unusual distribution of the bronchi to the lower lobe.

Bronchoscopy showed that the right stem bronchus was a little widened. The orifice of the left stem bronchus was narrowed by a shift of the carina to the left.

The patient was treated expectantly at first, but in view of the progressive and disabling dyspnoea, thoracotomy was felt justifiable.

Operation.—A postero-lateral thoracotomy was undertaken through the bed of the sixth rib. An enormous thin-walled cyst was found occupying the greater part of the right chest. The cyst arose from the lower lobe and was lightly adherent to the chest wall, the mediastinum and the upper lobe. The lower lobe was emphysematous and the greater part of it was obliterated by the cyst. The upper lobe appeared normal; the middle lobe was divided by a horizontal fissure into an upper and lower segment, but was normal in other respects. The inferior and superior pulmonary veins united well outside the pericardium. A dissection of right lower lobectomy was performed. The lower lobe artery, the inferior pulmonary vein and the lower lobe bronchus were identified and dealt with, individually, in that order. The chest was closed without drainage.

She made a good recovery, and when seen in the outpatient department, three months later, was perfectly fit.

Pathological examination of the cyst showed it to be an enormous emphysematous bullous cyst.

Summary

As a rule, thoracotomy is not justifiable for emphysematous bullae as they are usually multiple and bilateral. In this case, however, progressive dyspnoea and the absence of any evidence of other cysts made thoracotomy justifiable.

I wish to thank Mr. T. Holmes-Sellers for allowing me to take charge of this patient and operate on her. I also wish to thank Dr. K. Stokes and Dr. L. G. Blair for their permission to publish this case and the x-ray plates.

IDIOPATHIC LUNG ABSCESS BURSTING INTO THE CHEST WALL

By K. M. MUCHRIKAR

Medical Officer, Dabra

A HINDU male cultivator, aged 30 years, consulted me for an operation on a big tumour which had grown over his left chest in fifteen days and which was causing stretching pain at the local site. It had also given rise to a slight dry cough for four days. There was no recent history of any acute illness and the swelling had grown gradually.

On examination, I found that the swelling was of the size of a small coconut, like a balloon distended with gas, by the side of the pectoralis muscle, very tense and slightly hot to touch. The percussion note was dull but on auscultation breath sounds were clearly heard. However, the heart sounds were accentuated over the precordia and an indefinite thrill was occasionally felt under the palm with no definite propagation.

At first sight it appeared to be like a cardiac aneurysm but because of the unusually big size and absence of other special features this diagnosis was ruled out.

A deep abscess underneath the pectoralis muscle was excluded due to the absence of dullness and fluctuation. A localized pneumothorax giving rise to such a ballooned swelling in the absence of any visible respiratory distress and expectoration was also an abnormal imagination.

Consequently an exploratory puncture was decided upon to arrive at a definite diagnosis. There was a forcible rush of air through the needle and a small streak of pus was left near its tip.

The next day, the patient was screened and, to one's astonishment, the radiologist reported a big abscess on left lung with a fluid level (left upper zone).

(a) Examination of blood.—Leucocytosis 21,200, poly 89 per cent, lympho 11 per cent.

(b) Examination of pus (slide).—Pus cells many. No micro-organism seen.

Three days later, the abscess suddenly and spontaneously burst at midnight, while the patient was asleep. This evacuation probably occurred, through the exploratory puncture, during some strain of coughing in sleep, and resulted in complete disappearance of the tumour. During this period the patient was having a little rise of temperature between 99 and 100°F., and the slight dry cough was persistent.

The screening of the chest after bursting of the abscess: Abscess on left upper zone, lung markings considerably increased, no fluid level seen.

After ten more days the patient was fit to go home.

Interesting points

1. All the conditions under which a lung abscess generally forms were more or less absent. Pulmonary distress was almost nil to account for its development.
2. There were no complications or sequelae and the recovery was quick and eventful.
3. There was no toxæmia at any stage of illness, nor any marked deterioration in health.

With kind permission from Dr. B. Sahai, M.D., Superintendent, J. A. Hospital, Lashkar (Gwalior).

A CASE OF APPENDICITIS AND CON- GENITAL INGUINAL HERNIA

By A. D. BHANDARI

Medical Officer Incharge, District Hospital, Bareilly

RAMPAL, aged 2 years, was admitted on 22nd January, 1947, in the District Hospital, Bareilly. The mother stated that when the child was 6 months' old she noticed a swelling in the right inguinal region which used to swell more whenever the child cried. It was noticed that the swelling was reducible. During the last six months she observed occasional sickness and fever which she attributed to teething.

Condition on admission.—Emaciated, peevish child, much rundown, tendency to vomit after feeds and slight fever. There was complete inguinal hernia on the right side. Hernia was reducible and there was marked tenderness in the hernial region.

Under ether anaesthesia the usual hernial incision was made. On exposing the sac it was found to contain omentum which was adherent to the walls of the sac, caecum and appendix which was about 2 inches long and inflamed. Appendectomy was done and after the usual hernial repair the wound was closed. The child was given 400,000 units of penicillin injections in divided doses for 6 days. He made an uneventful recovery and was discharged cured on 7th February, 1947.

It appears that this child got mild attacks of appendicitis not amounting to suppuration. Size of the appendix was fairly big for a child of his age.

GAS GANGRENE

By S. K. ROY, B.Sc., M.B.

Medical Officer, Barabil Hospital, Bara Jamda, Singhbhum District

BHUBNA, Hindu male, age 55, occupation gardener, reported to the hospital on 9th October, 1946, with a small sloughing ulcer on the dorsum of the middle finger, left hand. Duration of the ulcer two days. Complained that during the last twelve hours the oedema had spread from the hand up to the lower part of the arm.

I examined and found a sloughing ulcer present on the dorsum of the interphalangeal joint of the left middle finger. Fair amount of oedema of the left hand, forearm and lower half of the arm. It pitted on pressure. Pulse 120 p.m., resp. 24, temp. 101°F., tongue—coated, bowels—not moving.

Blood picture.—Hb. = 35 per cent, R.B.C. = 2,600,000 per c.mm., W.B.C. = 16,000 per c.mm.

The ulcer cleaned and dressed. Put on a course of sulphathiazole, 4 tablets stat and 2 tablets every 4 hours.

Next morning, i.e. after 24 hours, the oedema spread up to the left side of the chest, front and back. The swelling of the hand, forearm and arm also increased to a great extent and angry

looking. The lower half of the arm, forearm and dorsum of the hand were covered with blebs, containing serosanguineous fluid. Some of the blebs on the dorsum of the hand along with the underlying soft tissue started sloughing. Webs of the fingers were covered with sloughing ulcers. Pulse 132 p.m., temp. 102.4°F. Patient rather toxæmic. Started a course of penicillin at 11 a.m. on 10th October, 1946, initial dose 25,000 units and subsequent doses 12,500 units every 3 hours intramuscularly. On 12th October, 1946, the temperature came down to normal and the swelling started subsiding. On 13th October, 1946, two bottles of penicillin (100,000 units each), which were 5 months outdated but kept all the time in refrigerator were given in 5 doses at 3 hourly intervals. General condition of the patient seemed to improve. No more penicillin being immediately available, sulphathiazole was stopped and the patient was put on a course of sulphadiazine 1 gramme in 4 c.c. given intramuscularly thrice daily for 3 days, and 25 per cent 25 c.c. glucose solution intravenously twice daily, as the patient was very weak and prostrated.

The hand, forearm and the arm were being dressed with acriflavine after hot bath (eusol, later on saline). Later on the dressing was vaseline gauze.

During the course of the disease the inflammatory swelling of the hand and the forearm was so great that formation of deep pus was apprehended, the presence of fluctuation being vague and indefinite, due to enormous oedema. The hand and forearm were tapped in several places to localize pus, but it was absent.

The patient was cured and discharged from the hospital on 19th November, 1946, with slight atrophy of the left forearm and deficient movements of the fingers and the hand.

Conclusion

Sulphathiazole did not appear to check the progress of the disease during the first day. Penicillin was effective in the next 48 hours. Treatment was completed with further sulphadiazine injections.

I wish to express my thanks to Dr. Frank McCay, M.A., M.D., Chief Medical Officer, Messrs. Bird & Co., for kindly allowing me to publish this case.

Therapeutic Notes

NOTES ON SOME REMEDIES

X. ANTIMONY AND ITS DERIVATIVES (PART I)

By R. N. CHAUDHURI, M.B., M.R.C.P. (Edin.),
T.D.D. (Wales), F.S.M.F.

Professor of Tropical Medicine, School of Tropical Medicine, Calcutta

ANTIMONY has been used in medicine since very early times and became very popular in the sixteenth and seventeenth centuries when

tartar emetic (potassium antimonyl tartrate) and a number of other compounds were freely prescribed for diseases like syphilis, leprosy, plague and ague. Owing, however, to indiscriminate use so much harm was done that it fell into discredit and was prohibited in many places; the graduates in medicine of Heidelberg, for instance, were required to take an oath never to use it. In the early part of the present century it occupied an unimportant position in the list of drugs, being used chiefly for its expectorant action in the early stages of acute bronchitis when the secretion of bronchial mucous membrane is scanty. The revival of antimony dates from 1908 when it was found to have a remarkable effect on trypanosomes in animals. In the following year Kerandal reported having successfully treated himself for trypanosomiasis with intravenous injections of tartar emetic after atoxyl had failed, and in 1913 Vianna and Machado in Brazil reported the cure of mucocutaneous forms of leishmaniasis. In 1915 Di Cristina and Caronia successfully treated infantile kala-azar prevalent in the shores of the Mediterranean, and in the same year their results were confirmed by Rogers and Muir in India. Thus was found a cure for a disease which was once regarded as inevitably fatal and in which it is now possible to predict a cure in over 90 per cent of the cases.

This success with kala-azar led within a short time to another discovery, *viz.*, a cure of schistosomiasis, a disease in which no drug was known to have any effect thirty years ago. The main credit belongs to J. B. Christopherson who, while treating a case of kala-azar in the Sudan with tartar emetic, noticed improvement in the symptoms of bilharzial disease from which the patient also suffered. The beneficial effects of this method of treatment have since been abundantly confirmed except when the disease is very chronic and advanced.

Antimony has also proved more or less successful in granuloma venereum, lymphogranuloma inguinale and a few other affections which will be mentioned later in this article.

Discovery of new compounds

In the treatment of kala-azar the antimonyl tartrates were found to possess certain disadvantages. Being very toxic, not enough of the drug could be administered at a time, hence the course of the treatment was prolonged. Moreover, the fact that it can be administered only intravenously, makes it unsuitable for children, and many cases also are very resistant to it. In the search for a better drug certain pentavalent antimony compounds have been produced; these are salts of para-aminophenylstibinic acid or substitution products of the same. These compounds are much less toxic and more effective than tartar emetic, reducing the average duration of treatment from 2 to 3 months to about 2 to 4 weeks and giving more cure rates

and fewer relapses; also some of them are suitable for intramuscular injection. But it should be noted that they are not always superior to the trivalent compounds (of which tartar emetic and foudadin are examples) in conditions other than kala-azar.

The antimony compounds for therapy may thus be divided into two classes—trivalent and pentavalent. A host of preparations are on the market, and the following list, though not complete, includes many of them.

I. Trivalent compounds

1. Antimonyl tartrates (potassium or sodium).
2. Fouadin (neoantimosan).
3. Anthiomaline (May & Baker).

II. Pentavalent compounds

1. Stibosan (von Heyden 471).
2. Neostibosan (von Heyden 693 B).
3. Urea stibamine (Brahmachari) and homologues, *e.g.* aminostiburia (Union Drug Co.), and stiburamine (B. C. P. W.).
4. Solustibosan (Bayer 561) and Stibatin or sodium antimony gluconate (Glaxo).
5. Neostam or stibamine glucoside (B. W. & Co.).

Dosage and methods of administration

Most of the compounds are supplied in sealed ampoules in powder form or in solution ready for injection. The powder is freshly dissolved in sterile distilled water at the time of injection as the solutions are liable to undergo chemical changes on keeping. The dosage varies with the toxicity of the individual drugs, but treatment should always be commenced with small doses, gradually increasing the subsequent doses so that tolerance may be established. In debilitated patients the dose is reduced, but children tolerate antimony better than adults and require relatively larger doses. The total amount required of a drug to cure varies in different diseases and often in the same disease according to the condition of the patient. Most of the drugs are given intravenously, some are designed for intramuscular injection, while others can be given in both ways. Tartar emetic specially and to a less extent some of the pentavalents are irritant to the subcutaneous tissues, and it is most important that the needle of the syringe is actually in the vein before the injection. The injections are given at slow rate on consecutive or alternate days. They should not be given on a full stomach for fear of causing nausea and vomiting, and the patient should remain in bed for a while after the injection. Treatment, once commenced, must not be interrupted unless for grave complications, *e.g.* pneumonia, severe dysentery, jaundice, nephritis and hæmorrhage, and the aim should always be to give the full course, otherwise there will be a

relapse. Pregnancy is not a contra-indication for its use.

The dosage, etc., of the commonly used drugs are summarized in the table :—

of temperature after each injection. The febrile reaction may be due partly to the water used in making the solution, and it is always well to use fresh supply of distilled water. By careful

TABLE

Drug	Initial dose	Maximum dose	How given	Percentage of antimony	Frequency of injections	REMARKS
Antimony potas- sium tartrate.	$\frac{1}{2}$ gr.	2 to $2\frac{1}{2}$ gr.	I.V.	36	Alternate days	Used as 1 to 2% solu- tion.
Antimony sodium tartrate.	$\frac{1}{2}$ gr.	2 to $2\frac{1}{2}$ gr.	Do.	37.5	Do.	Do.
Fouadin ..	1.5 c.c.	5 c.c.	I.M.	13.5	Do.	Supplied in ampoules of 7% solution.
Anthiomaline ..	1.5 c.c.	4 c.c.	I.M. or I.V.	16	Do.	Ampoules of 6% solu- tion.
Neostibosan ..	0.2 gm.	0.3 gm.	I.V. or I.M.	42	Daily	5% (I.V.) and 25% (I.M.) solution.
Urea stibamine ..	0.05 gm.	0.2 gm.	I.V.	40	Alternate days	5% solution. Usual dosage*.
Aminostiburia ..	0.05 gm.	0.2 gm.	Do.	25	Alternate days (or daily in selected cases).	Do.
Solustibosan ..	2 c.c.	6 c.c.	I.M. or I.V.	1 c.c. = 20 mg. Sb	Do.	Ampoules of solution.
Neostam ..	0.2 gm.	0.3 gm.	I.V.	30	Alternate days	5% solution.
Stibatin ..	5 c.c.	20 c.c.	I.M.	20 mg. per c.c.	Daily	Supplied as a solution containing 20 mg. of Sb per c.c.†.
Stibatin (concen- trated).	1 c.c.	4 c.c.	Do.	100 mg. per c.c.	Do.	

I.V. = Intravenously.

I.M. = Intramuscularly.

* Adults :

First injection—0.05 gm.

Second injection—0.10 gm.

Third injection—0.15 gm.

Subsequent injections—0.20 gm.

Children :

Maximum dose—0.15 gm.

Infants :

Weight less than 20 lb.—maximum dose 0.10 gm.

† Adults : 15 to 20 c.c.

Children : 10 to 15 c.c.

Infants : 5 to 10 c.c.

Mode of action

After injection antimony is quickly absorbed and evenly distributed in the body but is almost completely eliminated in two or three days, so that it never attains a high concentration in the blood. How it acts is not known, but in the protozoal diseases its action is certainly not a direct one. In schistosomiasis antimony appears to have a direct action on the adult parasites and to a less extent on the eggs. Fairley believes that it acts selectively on the reproductive organs of the female bilharzia and this brings about, firstly, the shrunken appearance of the egg and, secondly, cessation of egg-laying capacity (Manson-Bahr).

Toxic effects

After even a small therapeutic dose of tartar emetic certain toxic symptoms are to be expected. Immediately after the injection there is often a fit of coughing with, it may be, a feeling of constriction in the chest. Headache, nausea and vomiting may follow. In patients with only slight or no fever, febrile reactions are common; in some cases fever and rigors occur after the first injection, or there may be a temporary rise

regulation of the doses the toxic effects are abolished or reduced and tolerance is quickly established, but certain races are unduly susceptible to antimony; for instance, the Sudanese do not stand the tartrates well. Among the late symptoms may be mentioned diarrhoea, joint and muscular pains, jaundice and severe lung complications such as broncho-pneumonia.

With the pentavalent compounds these complications are rare. In a few cases anaphylactic symptoms occur, these set in suddenly after a few injections, especially when the injections have been rather widely spaced. The patient's face becomes puffy, the voice husky and an urticaria rash may appear all over the body. There is difficulty in breathing, the pulse is imperceptible and the patient may even go unconscious for a few minutes. Recovery, however, is rapid and is hastened by an injection of adrenaline ($\frac{1}{4}$ to $\frac{1}{2}$ c.c.). Another complication that may occur is hæmorrhage from the gums, nose and stomach.

If severe toxic symptoms arise, the drug should be temporarily discontinued; after an anaphylactic shock the best course is to employ another compound and to begin with very small doses.

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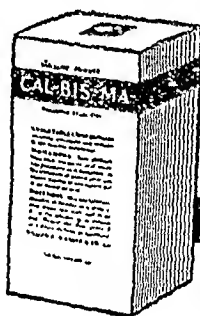
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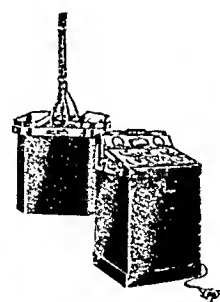
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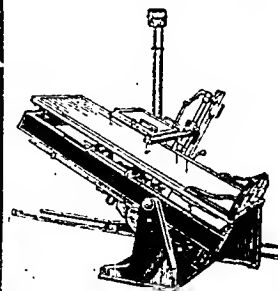
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Indian Medical Gazette

JULY

THE PASSING OF THE I.M.S.

Before these lines appear in print, in a delayed issue of this journal, a great service will have passed away.

THE BEGINNING

THE beginning of the Indian Medical Service can be traced to the 'Surgeons and Barbars' engaged by the East India Company for their ships, warehouses and factories in India and in the Far East. It was then a service as much for the Far East as for India.

The Company's first fleet sailed from England for the East in December 1600. It consisted of four ships. To each ship were appointed 'Surgeons twoe and a Barbar' (this journal, vol. XXXV, 1900; Crawford, D. G., *History of the Indian Medical Service, 1600-1913*, Thacker, Spink & Co., Calcutta, 1914).

For shore duties the surgeons were allotted to the various establishments: Bombay, including Surat and the West Coast up to Persia; Madras, including the East Coast; and Bengal, including the Bay.

Associated with this period there are several well-known names. The first one deserving mention is that of

Surgeon-General John Woodall

who in 1614 was 'sworn to provide competent surgeons and to fit up their chest properly'. He was practising in Wood Street, London, had made a name for himself in curing plague, had a secret remedy of his own called *aurum vite*, was a member of the London Company of Barbar Surgeons and was Surgeon to St. Bartholomew Hospital.

In the following year he was charged with gross abuses:

'Mr. Woodall's great abuses in the Chirurgeon's chest, putting divers boxes of one simple, whereas he writeth in their superscriptions to be diverse; drugs rotten, unguents made of kitchen stuff. Boys that have no skill thrust into places of chirurgeons. He is to be accounted guilty of the death of so many men as perish through his default'.

Obviously the complaint was not well founded. The Surgeon-General remained. In 1618 his salary was increased from £20 to £30 a year.

The second name is that of

Dr. Gabriel Boughton

of the Bombay establishment. His professional skill and loyalty to the Honourable Company are well known to several generations of school teachers and their pupils in India. He was stationed at Surat and was

sent for by the Mughal Emperor Shah Jahan to treat his daughter Jahan Ara who had been badly burnt. He cured her and refusing all personal favours asked for and obtained concessions in trade for his masters of the Honourable Company. Later he cured a lady of Prince Shuja's harem at Rajmahal and obtained further concessions in Bengal.

(As a matter of fact the stories are myths. Dr. Boughton was nowhere near Agra or any other royal residence near Surat when the Princess got burnt. Nor was he anywhere near Rajmahal when further concessions were obtained.—Crawford, *loc. cit.*)

The Princess had been burnt while attempting to help a dancing girl of the palace, whose clothes had caught fire, and was treated and cured by *Hakim* Anitulla of Lahore. The dancing girl died. This happened in 1643-44. Boughton's mission went to Agra in 1645.

The factory at Balasore made possible by the supposed further concessions had been established in 1633, 12 years before Boughton went to Agra.

The fact that these stories gained currency within 20 years of Boughton's death points to a widespread belief in Boughton's professional skill which must have been of a high order.)

The third name is that of

William Hamilton

who came out to India as Surgeon of the frigate *Sherborne*. He deserted on arrival in Madras, reached Calcutta and found employment in the establishment there.

The famous Embassy to Delhi started from Calcutta in 1714 with Hamilton as medical officer. Its object was to obtain concessions from the Mughal Emperor Farakh Siyar who had been in Bengal as a Deputy Governor of the Emperor. It was hoped that he would be influenced through his courtiers and officers of the household.

Hamilton cured the Emperor of 'swellings in the groin' which were preventing a marriage. The Emperor was so pleased that he wanted to keep Hamilton at Delhi for good. The latter however obtained leave to go to England. He died before leaving Calcutta and Farakh Siyar sent down a special messenger with an inscription for the tombstone and, incidentally, to confirm the death. The inscription, in Persian, is translated as follows:—

'William Hamilton, Physician, Servant of the English Company, who had gone along with the English Ambassador to the Illustrious Presence and had raised his name high in the four quarters by reason of the cure of the King of Kings, the Asylum of the world, Muhammad Farakh Siyar, the Victorious, with a thousand difficulties having obtained, from the Court of the Asylum of the world, leave of absence to his native land, by the decree of God on the

4th December, 1717, died in Calcutta, and in this place was buried.

The English inscription on the tombstone is : 'Under this stone lyes the Body of William Hamilton Surgeon who departed this life the 4th December, 1717. His Memory ought to be dear to his nation, for the credit he gained ye English in curing Ferrukseer, the present King of Indostan of a malignant distemper by which he made his own name famous at the Court of that Great Monarch; and without doubt will perpetuate his Memory, as well in Great Brittain as all other Nations in Europe'.

Hamilton was buried in Calcutta in the old churchyard in which later was built St. John's Church. At the time of clearing the ground the forgotten tombstone, fallen and buried under earth with the passage of some 70 years, came to light. It was, then, set up in the tomb of Job Charnock, the founder of Calcutta. This tomb is situated in the north-west corner of the ground of St. John's Church, Calcutta.

William Hamilton was a bold medical man and the distemper he cured was probably a hydrocele which prevented a marriage.

A writer of a comparatively recent period has made a 'Scotch Surgeon Gabrail Hamilton' cure the Mughal Emperor. Such can be the general information on matters Indian, of even recent British writers. (*The Seven Cities of Delhi* by Gordon Risley Hurn, R.E., London, Thacker & Co., Calcutta, Simla, Thacker, Spink & Co., Bombay, Thacker & Co., 1906.)

The fourth name is that of

John Holwell

an Irish born son of a London merchant and grandson of John Holwell, Royal Astronomer, a noted mathematician.

He was eighth on the list of 11 members of the Council of Fort William in 1756. When Calcutta was attacked by Seraj Uddola, of these 11 members, 4 were not in Calcutta at the time, 4 including Drake, the Governor, fled to the ships and 3, Pearkes, Holwell and Eyre, remained at their posts till the fall of the fort. Pearkes made his escape after the surrender. Holwell and Eyre were among those who were confined for the night in the Black Hole. During the night Eyre died. Holwell only remained.

He had been elected Governor as soon as the flight of Drake had become known. The gate towards the river, then, had been closed to prevent further desertion and a council hastily summoned. Pearkes the senior-most member had waived his right in favour of Holwell who thus had become the Governor and the Commander-in-Chief.

Prior to being a member of the Council Holwell had been an ordinary member of the service and had effected noteworthy improvements in sanitation and suggested reformation in the Collector's Court in Calcutta, while on leave in England. On the acceptance of the

suggestion by the Court of Directors he himself had been nominated to be the Collector in Calcutta. He had then returned to Calcutta in 1752, as a covenanted civilian, twelfth in the Council.

Not counting Holwell, there were 6 medical officers stationed in Calcutta at the time of its capture. Of these only one was not in the Fort. He,

William Fullerton,

fifth on our list, was on duty with the women, children and others on board the ships.

He had been Second Surgeon in succession to Holwell for over 10 years when Calcutta fell.

He made money in Calcutta in business 'speculating heavily and successfully in salt-petre in Bihar'.

He was in Bihar when the 'English *sipahis*' siding with the Emperor's Governor who had revolted were completely defeated on 9th February, 1760, at Mohsinpur near Patna, by the Emperor's army. All the English officers with the *sipahis* were killed. Fullerton then assumed command and the remnant of the party succeeded in making good their retreat to Patna. At Patna they were besieged. Fullerton made the besiegers retreat with considerable loss to them.

Fullerton knew the vernacular well and 'associated with native gentlemen much more than was usual among the English in Bengal'. He seems to have got mixed up a good deal 'in native intrigue' also. When he went on leave the Governor of Bengal wrote :—

'Mr. Fullerton is a great Bane to Society, and the Company's service; so much is said of him that he may not on any account be suffered to return'

In spite of the Governor's displeasure Fullerton returned and played a lucky rôle in the Patna massacre on 5th October, 1763, in which all other Britishers captured in a previous battle were murdered.

Later, in 1764 he was the interpreter in an enquiry into the conduct of Nanda Kumar whom the Commander-in-Chief wished to remove from the Nawab's service, on a charge of disaffection. He did not press home certain evidence with the result that the enquiry ended inconclusively. He was censured. ' . . . however as the Board do not suppose that his conduct could have proceeded from bad design but from inattention, they pass over with censure what must otherwise have called for the most exemplary severity'. Fullerton resigned and left.

(How an interpreter could press evidence home is not understood in the light of the present legal procedure.

Incidentally, later, Nanda Kumar was tried and hanged. Probably the interpreter then employed knew how to press the evidence home.)

Fullerton was a clever man of affairs with plenty of initiative. Besides, he was the first

member of the regularly constituted Indian Medical Service. In associating with 'native gentlemen' he was nearly two centuries ahead of his countrymen.

REGULAR CONSTITUTION

On 20th October, 1763, by orders passed in *Fort William*, individual medical officers serving in the Bengal Presidency were combined with effect from 1st January, 1764, into the Bengal Medical Service, with fixed grades and rules for promotion. Madras and Bombay medical services appear to have come into existence about the same time.

Some officers held double lower ranks simultaneously for several years, one for medical work and another for general military duties. Ultimately they made their choice for the promotion to higher ranks.

The military rank, however, did not count much those days. It was 'but the guinea's stamp'. The pay too was little more than pocket money. The real gain to most came from private trade and to some from private practice.

The real rank was the position amongst the Company's officers, which was pretty high. The relative precedence was as follows: (1) the Agent of the Area; (2) the Accountant; (3) the Storekeeper; (4) the Purser Marine; (5) the Secretary; (6) the Surgeon; (7) the Steward; (8) the General Body of (i) merchants, (ii) factors, (iii) writers, and (iv) apprentices. (The Chaplain when present ranked third.) From the last category, the general body, rose, at a later period, the steel framework of the Indian administration, the I.C.S.

DUTIES, ETC.

Before 1788 medical officers with the troops were hardly considered officers. They started as Assistant Surgeons and were 'appointed to be officers', later.

The Company's army had by now greatly increased. It defended the property and privileges of the Company and also aided neighbouring chiefs and princes for a consideration.

The civil and military branches of the I.M.S. were united and separated again several times. The military duties were those performed in India at the present moment by the newly constituted I.A.M.C. (Indian Army Medical Corps).

The civil duties once upon a time included everything falling under Medical Relief, Public Health, Prisons, Forensic Medicine, Medical Education, Medical Research and Research on allied subjects. The numerical strength of the civil branch at this time was greater than that of the military branch. All civilians, however, had to start as soldiers.

The civil branch ultimately was placed under the D.G., I.M.S. and the military under the D.M.S. (Director of Medical Services). The latter director for a long time belonged to the R.A.M.C. (Royal Army Medical Corps); the

British Service for duty with the British Troops. Later he was selected from the R.A.M.C. and the I.M.S. (military branch) alternately.

In addition to the ordinary duties which fall within the scope of medical men, the Service has also supplied Post Masters, Cotton Agents, Mint Masters, Superintendents of Schools of Arts, Political Agents and Conservators of Forests. Chemists, Botanists and Zoologists there have been many. The Service played an important part in the organization of Forest and Veterinary Departments.

The versatility within the limits of medical duties, efficiency and physical fitness of the early I.M.S. officers cannot be illustrated better than by giving a brief account of

Frederic John Mouat.

Born 1816. Educated in London, Edinburgh and Paris. M.R.C.S. in 1838. M.D. Edin. in 1839. One of the Original Fellows of the Royal College of Surgeons, London, in 1844.

Entered I.M.S. as Assistant Surgeon in 1840. Surgeon in 1853. Surgeon Major in 1860.

Professor of *Materia Medica* in the Calcutta Medical College in 1841; also Secretary from 1841 to 1851. Professor of *Medicine* in 1849. First Physician *ex-officio* of the Calcutta Medical College Hospital in 1853.

I.G. of Jails in Bengal, 1855 to 1870. Deputed to visit the Andaman Islands to choose a site for a convict settlement which later became Port Blair. Wounded in the mouth and had two ribs broken in a fight with the Andamanese.

Retired from the I.M.S. and was appointed one of the Medical Inspectors of the Local Government Board in England in 1874. Held this office until 1887, for 13 years.

As a Medical Inspector, in connection with the restoration of the Church of St. Peter in the Tower of London, with other officials of the State, was present at the removal of the pavement, and identified the skeletons of the following:—

1. Queen Anne Boleyn, once the beloved Queen of King Henry VIII and beheaded by his orders, mother of Queen Elizabeth the Great in whose reign the East India Company and the I.M.S. began life.

2. Lady Rochford, Companion to Queen Katharine Howard, beheaded by the orders of the same King.

3. Duke of Somerset beheaded in the reign of Edward VI.

4. Duke of Northumberland, father-in-law of Lady Jane Grey, executed in the reign of Queen Mary.

5. Duke of Monmouth, natural son of Charles II, executed by the orders of James II.

The skeleton of Katharine Howard, also executed by Henry VIII, was not found.

(After all, what was going on in England under the Tudors and the Stuarts was not different from the intrigues of the then Imperial,

Royal and Princely India : only occurring in a vaster area, in contiguous territories and in the midst of a larger population it created more confusion at times.

The confusion would have been worse if the masses, the peasantry which is India, had taken part in it. The peasantry did not and could not take part because it did not become aware of the political changes until after the events, thanks to the system of payment of land revenue in India.

The land revenue in India has been paid, since times immemorial, by the villagers at the same central offices, the *Tahsils* of Northern India—from *hasil* = gain—to the same local officials who have stamped the receipts with the same official stamp. The villagers did not become aware of a change of power until many years after the change had taken place. Of the impending changes they knew nothing.)

Died in London in 1897. A life well lived indeed.

These accounts of the lives of Service men culled from the monumental work of

Colonel D. G. Crawford, I.M.S.
(Bengal Service, Retired List);

the historian of the Indian Medical Service, are not likely to be well known to the younger generations of the members of the Service. Much less are they likely to be so known to non-Service men who now have been handed the torch of medical knowledge lit over three centuries ago and kept alight nearly all this time by the I.M.S.

The latter day accomplishments of the Service are matters of international fame in medicine. A few of the many names so known to fame are :—

1. Ross, R.
2. Rogers, L.
3. Harvey, W. F.
4. Cunningham, J.
5. Christophers, R.
6. Knowles, R.
7. McCarrison, R.
8. Sinton, J. A.
9. Sutherland, W. D.
10. Megaw, J. W. D.
11. Anderson, L. A. P.
12. Tarapore, P. K.
13. Chopra, R. N.
14. Iyengar, K. R. K.
15. Sokhey, S. S.
16. Bhatia, S. L.

Most of them are alive and well, and two are still serving as non-I.M.S. officers.

Indians were admitted to the Service a long time ago but numerically and in advancement they failed to attain equality with the Britishers up to the last. Even their emoluments decreased during the last 27 years or so, through two revisions of pay and allowances. The military traditions, however, established a comradeship

which worked very well indeed in matters of duty and even of social intercourse.

THE END

After the military branch had been absorbed completely into the I.A.M.C. during the last few months a very much thinned civil branch remained until the 15th August, 1947. Many of those who before this date had signed their own deed of abdication were not really sad. They would not have desired a great service to have survived its greatness.

The Service was great partly from definition, partly from exclusion, partly from martial merit and partly from professional merit. The first two privileges wore out during the two World Wars, against the onslaughts of increasing forces of democratization. The third privilege has been inherited intact by the youthful offspring of the Service, the I.A.M.C. The last privilege was born to flourish, to mature, to go to seed and, thus, to multiply 'an hundred fold' on ground made good by human evolution. The sower came out to sow and he has sown. He has now departed. The I.M.S. has not died : it has been fulfilled.

The end was not unexpected, though not all who came to this prognosis looked upon it as a fulfilment. Long before the World War II, during the Annual Service Dinners in London, a swan of ice-cream, representing the last swan song of the Service, and an elephant of ice, representing the melting Indian Empire, taken round on trolleys, had saddened the hearts of the diners, rendered naturally heavy at the stage of nuts and wine.

THE SHAPE OF THINGS TO COME

When the prejudices and preferences of to-day have ceased effervescing the service which will ultimately take the place of the I.M.S. will not be much different from it. After all, professional efficiency, organizing capacity and administrative ability of higher order are more likely to be found amongst disciplined medical men who are physically fit, who travel and who enjoy a certain measure of leisure. The future is only the past entering through another door.

I.M.S. FAREWELLS AND RETROSPECTS

ON p. 438 in this issue will be found a letter of retrospect and farewell which Lieut.-General R. Hay, C.I.E., K.H.P., I.M.S., Director-General, Indian Medical Service, has addressed to all officers of the Indian Medical Service on the eve of its dissolution on 15th August, 1947. We wish him also farewell.

As the General is leaving India as a perfectly fit soldier of Category A, we further wish him success in his future undertakings and hope that he will be on the list of the 'Distinguished Contributors' to the *Indian Medical Gazette* for a long time to come.

On pages 420 and 422 will be found accounts of the first I.M.S. dinner in London held fifty years ago and of the last dinner held this year.

THE NEW INDIAN CHIEF OF STATE MEDICAL AND HEALTH SERVICES IN INDIA

ALL concerned have been notified that with effect from the 15th August, 1947, the posts of Director-General, Indian Medical Service, and Public Health Commissioner with the Government of India will be abolished and a new post

of Director-General of Health Services created. All communications intended for
The Director-General, Indian Medical Service
or

The Public Health Commissioner with the
Government of India
should in future be addressed to
The Director-General of Health Services, New
Delhi.

We offer our hearty congratulations to
Dr. Jivraj N. Mehta, M.D. (Lond.), M.R.C.P., the
first Indian occupant of this post.

Special Article

SCIENCE AND INTERNATIONAL GOODWILL

By S. L. BHATIA, C.I.E., M.C., M.A., M.D. (Cantab.),
F.R.C.P. (Lond.), F.R.S. (Edin.)
COLONEL, I.M.S.

Inspector of Civil Hospitals, Assam

(A speech delivered at the U.N.E.S.C.O. Celebrations
in Shillong, Assam, on 29th November, 1946)

WHAT is this diabolical thing, called science? This question has been repeatedly asked by men all the world over, ever since a couple of atom bombs found their way over Japan in 1945, and their consequences and repercussions were brought home to us in a most dramatic fashion.

Science is knowledge primarily based on facts, which are ascertained by observation and experiment. From these facts inferences are drawn and general laws and principles are formulated, into which these facts can be fitted in. 'Facts are the air of a scientist' said Pavlov the celebrated Russian physiologist. 'Without them you never can fly. Without them your theories are vain efforts'. Science concerns itself with the discovery of truth. The social importance of science is due to the fact that it enables us to manipulate and gain mastery over nature.

As a factor in human life, the rôle of science is very recent. It began with Galileo, and has existed for some 300 years. During the first half of that period, it remained a pursuit of the learned, and did not affect the thoughts or habits of ordinary men. It is only during the last 150 years that it has become an important factor in determining the everyday life of the people. But these 150 years of science have proved more explosive than 5,000 years of pre-scientific culture. Scientific knowledge advanced rapidly throughout the 17th, 18th and 19th centuries. But it was in the 19th century that it really began to affect the lives of men.

Science may be divided into two groups :—

(a) The physical group comprising physics and chemistry. It deals with properties of matter apart from life.

(b) The biological group comprising botany, zoology, physiology, etc. Medicine is included in this group. It deals with phenomena of life associated with matter.

The effect of biological science on human life has been very small so far. There is of course Darwinism and the idea of evolution, and these have served as arguments in favour of nationalism. We may, however, expect greater effects from this in the near future; for instance, there are great potentialities in Mendelism and the study of heredity, so far as the future of the human race is concerned. Hitherto the most effective of the biological sciences has been medicine, on account of its influence on the health of the community as well as the individual. It has taught many potent means of preventing and curing quite a number of diseases and thus raising the standard of health.

But it is the physical sciences which have had the greatest effect on the affairs of mankind. It is they that brought about industrial revolution in the 19th century. One of the effects of this industrial revolution is to make the entire world an economic unit. Another effect of industrialism is to increase the productivity of labour, and thus make more luxuries possible. In England, its early effects were an increase in population with a lowering in the standard of living. This was followed by a wave of prosperity, when the wages increased and the hours of work diminished, accompanied by expansion of trade.

Modern industrialism produces a struggle between nations for markets and raw materials. This produces international competition. The men of science in different national groups continually produce more and more elaborate methods of attack and defence. It is undoubtedly true that it is science mainly that has determined the importance of raw materials in international competition. Coal, iron and oil are the basis of power and of wealth; they are also indispensable in the art of war.

Science has been a great stimulus to the growth of nationalism. Nationalism has grown

rapidly because of the increase of large-scale organization, in which science has materially helped. Without railways, telegraphs, telephones and the radio, the control from the centre would have been very difficult. Modern methods of printing and advertising make the dissemination of knowledge and information easier and quicker. Consequently the press has become a great force in our present-day civilization. Broadcasting also is fast becoming an important factor in moulding public opinion. All this is due to the scientific development in the purely physical realm. In fairness to the men of science, I must point out that they unfortunately pay little heed to the purpose to which their discoveries are put. This application is largely in the hands of politicians and others. Scientists are essentially searchers after truth, and they usually avoid extreme dogmatism. It is the politicians who give colour to their discoveries. As an example, I may quote Bertrand Russell :—

‘The dispute between anarchism and bureaucracy at present tends to take the form of one side maintaining that we want no organization, while the other maintains that we want as much as possible. A person imbued with the scientific spirit would hardly even examine these extreme positions. Some people think that we keep our rooms too hot for health, others that we keep them too cold. If this were a political question, one party would maintain that the best temperature is the absolute zero, the other that it is the melting point of iron. Those who maintained any intermediate position would be abused as timorous timeservers, concealed agents of the other side, men who ruined the enthusiasm of a sacred cause by tepid appeals to mere reason. Any man who had the courage to say that our rooms ought to be neither very hot nor very cold would be abused by both parties and probably shot in No Man’s Land. Possibly some day, politics may become more rational, but so far there is not the faintest indication in this direction’.

Scientific inventions facilitate propaganda and centralization of control, resulting in the formation of groups of human beings, which become very disciplined and very docile to their leaders, whose influence whether for good or for evil is increased. In other words, the advent of a large number of dictators in the world during the last quarter of a century may be attributed perhaps in the last resort to the progress of physics and chemistry. There is really nothing wrong in this. But the fact is that these groups are intensely national. Had there been harmony and goodwill between them, all would have been well. Each would live and work in its own way, and each would contribute to the sum total of human happiness and culture. This, however, is not so. There has been rivalry between the groups, resulting in terrible disasters. The groups might unite. I sincerely hope, they will; but will they? Take the analogy of a football match. The object of a

football team is to kick goals. If two football teams combined and kicked the ball over the two goals, in a given period of time, many more goals would naturally be scored. But who would suggest that this should be done, the object of a football team being not to kick goals but to win? Similarly the object of the different groups of human beings is not to kick goals but to win; and it is this spirit of rivalry which leads to friction.

When I look at the world to-day, I cannot help agreeing with Fisher, that in history one sees ‘one emergency following upon another as wave follows upon wave. There is only one great fact with respect to which, since it is unique, there can be no generalizations, one safe rule for the historian: that he should recognize in the development of human destinies the play of the contingent and the unforeseen. This is not a doctrine of cynicism and despair. The fact of progress is written plain and large on the page of history; but progress is not a law of nature. The ground gained by one generation may be lost by the next. The thoughts of men flow into the channels which lead to disaster and barbarism’.

Men often say that science has been a boon to mankind. But those of us who have lived through two world wars are apt to be a bit sceptical. There is one obvious fact that science in its application may or may not be an instrument for good. In fact, it is actually proving to be a potent instrument of destruction, and its unbridled use in the hands of politicians will destroy the world.

Science is used to promote the power of dominant groups rather than to make men happy; and whether it will prove to be a blessing or otherwise is still an open question.

There are two ways in which science may affect human life :—

(a) Without altering men’s passions or their general outlook, it may increase their power of gratifying their desires.

(b) It may operate through an effect upon the theological or philosophical conceptions, which are accepted in practice by most intelligent men. Of these, the latter effect is almost negligible; the first is by far the more important.

Beyond the actual facts of life and matter with which science deals, there is the question of fundamental values to be attached to human existence, which is of the greatest importance for promoting harmony on earth. Here we proceed from the realm of science into that of metaphysics and theology. But a consideration of the value of life on earth and its ultimate destiny can never be ignored, and I hope that scientific outlook will eventually offer a solution to bring about harmony between the various religious faiths. In fact, there is a tendency amongst the more advanced sections of humanity to believe that different religions are but different paths to one and the same goal. This

realization will again help to promote goodwill, and bring about peace on earth.

Science alone is not, and can never, be a panacea for all the ills with which humanity is afflicted. It is really not diabolical; but a great responsibility rests on those who wield power, for they can by their influence make either good or bad use of the science which is placed at their disposal. A change of heart in them is therefore necessary. It is also necessary that the scientists should assert themselves and allow their discoveries to be used only for good purposes. A little more of kindness is needed in this world, a little more of grace and charity. Can these qualities come from science? I wonder. Speaking as a physiologist, I wish it were possible that some substance, possibly of the nature of a hormone, could be injected into the blood of mankind, which would fill them with kindness towards their fellow men. It is only kindness and benevolence that can save mankind.

A question arises, what can be done to promote mutual goodwill amongst the nations. To bring this about, better knowledge of each other is essential. Professor A. V. Hill, who came to India in the latter part of 1943, told me that a very happy relationship exists between King's College, Cambridge (England), and Berkley College, Yale (U.S.A.). It is a purely informal arrangement, but is greatly appreciated by both parties to it. They call it an *Amicabilis Concordia*. When a member of the staff, or a student of Berkley College goes to Cambridge, he is accepted as a member of the family by King's. When a King's man goes to Yale, he is made to feel at home at Berkley. When the Provost of King's goes to New Haven, he is received with honour by the Master of Berkley College and *vice versa*.

It is possible to establish similar familiar relationships between the universities and other learned institutions in India, and corresponding bodies in Great Britain, the United States, and other countries. During my visit to the United States and Canada last year as a member of the Indian Scientific Mission, I discussed this matter with several people and the suggestion was welcomed in many places, specially in Toronto.

By establishing *Amicabilis Concordia* between the cultural institutions in different countries in this way, it will be possible to increase mutual goodwill and co-operation. It is the simplest and the best method of promoting international friendship by personal contacts.

Medicine as a science stands on a much higher pedestal than pure physical science, so far as the welfare of humanity is concerned. At a memorable address delivered at the commencement of this century in January 1901 Sir William Osler said:—

'For countless generations the prophets and kings of humanity have desired to see the things which men have seen, and to hear the things

which men have heard in the course of the wonderful 19th century. To the call of watchers on the towers of progress there had been the one sad answer—the people sit in darkness and in the shadow of death. Politically, socially, and morally the race had improved, but for the unit, for the individual, there was little hope. Cold philosophy shed a glimmer of light on his path, religion in its various guises illumined his sad heart, but neither availed to lift the curse of suffering from the son of Adam. In the fullness of time, long expected, long delayed, at last science emptied upon him from the horn of Amalthea blessings which cannot be enumerated, blessings which have made the century for ever memorable; and which have followed each other with a rapidity so bewildering that we know not what next to expect. To us in the medical profession, who deal with this unit, and measure progress by the law of the greatest happiness to the greatest number, to us whose work is with the sick and suffering, the great boon of this wonderful century, with which no other can be compared, is the fact that the leaves of the tree of science have been for the healing of the nations. Measure as we may the progress of the world materially, in the advantages of steam, electricity, and other mechanical appliances; sociologically, in the great improvement in the conditions of life; intellectually, in the diffusion of education; morally, in a possibly higher standard of ethics—there is no one measure which can compare with the decrease of physical suffering in man, woman, and child when stricken by disease or accident. This is the one fact of supreme personal import to every one of us. This is the Promethean gift of the century to man'.

These are noble words and noble sentiments; they represent typically the complacent mood of 19th century science. Since then much water has flowed under the bridge. In spite of all vicissitudes, I am glad to say, that medicine has continued to make good progress and the expectations of Osler have been fully justified. In fact, during the two world wars many important discoveries have been made in medical science for the alleviation of human suffering. We of the medical profession, who worship at the shrine of Aesculapius, have remained true to our oath of allegiance to alleviate suffering, and have not allowed our efforts to be diverted to nefarious ends.

Love of knowledge, a keen spirit of enquiry and pursuit of truth are the foundations of scientific endeavour and progress, and their essential purpose is the welfare of mankind. As an accompaniment of this scientific progress, there is need for a new moral outlook, which would show respect for all that is best in man. It is to cultivate this new moral outlook as well as to emphasize the international aspect of science, which recognizes no boundaries of race, creed or colour, that we hold to-day the inaugural celebrations of the United Nations Educational,

Scientific and Cultural Organization. I wish this world organization the best of luck, and all the success it so richly deserves.

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Medical News

INDEPENDENCE DAY MESSAGES

COPIES of the following messages in connection with the Independent Day celebrations on 15th August, 1947, have been received :—

1. Chinese President's telegram to Lord Mountbatten, and the reply to President Chiang.
2. Message to the Indian press from His Excellency Lord Mountbatten of Burma.
3. Message to the Indian press from Her Excellency Lady Mountbatten of Burma.
4. Message from Dr. Edward Phelan, Director-General, International Labour Office, Geneva, to Pandit Nehru, and Pandit Nehru's reply.
5. Pandit Nehru's reply to French Foreign Minister.
6. Message from High Commissioner for Canada.
7. Message from the Prime Minister and Acting Minister of Foreign Affairs, Oslo (Norway), to Pandit Nehru, and Pandit Nehru's reply.
8. Message from the Prime Minister of Australia to Pandit Nehru.
9. Message from President Chiang Kai Shek to the Prime Minister of India, and Pandit Nehru's reply.
10. Message from the Chinese Prime Minister to Pandit Nehru, and Pandit Nehru's reply.
11. 'Chant for Indian Freedom' from the Ambassador of the Republic of China.
12. Message from M. Soodarsono on behalf of the Indonesian Republic.
13. Message from H.M.'s Minister in Nepal to Pandit Nehru, and Pandit Nehru's reply.
14. Congress President's message to the nation.
15. Pandit Nehru's message to the nation.
16. Pandit Nehru's message to all Indian diplomatic representatives abroad.
17. Pandit Nehru's message to Indians overseas.
18. Moulana Abul Kasam Azad's message.
19. Dr. Rajendra Prasad's message.
20. Sardar Vallabhbhai Patel's message.
21. Flag hoisting at embassy in China.

UNITED PROVINCES MEDICAL COUNCIL

(Minutes of the meeting of the United Provinces Medical Council held in its office at Lucknow on Wednesday, 26th March, 1947, at 11 a.m.)

1. (a) THE minutes of the last meeting were confirmed but it was decided that no action be taken on resolution no. 23 till its defects were rectified.
- (b) In view of the fact that the Public Health and Medical Reorganization Committee is sitting, it was decided that the question of suggesting amendments to the United Provinces Medical Act be taken up at once, instead of being referred to a sub-committee, and the Council, after going through new proposals, suggested amendments to the said Act.
2. Government notifications notifying the elections of Khan Bahadur Dr. Mohammad Abdul Hameed and Dr. S. P. Gupta, as members of the Council, were read and recorded:

3. With reference to Medical Council resolution no. 4 of November 1946, the postponed case against Dr. Har Datt Pant, L.M.P., was considered.

Dr. Pant was not present but was represented by Mr. Ghananand Pande, Advocate, who was heard by the Council.

The Council considered the case of Dr. Har Datt Pant and decided to issue a warning to Dr. Har Datt Pant to be more careful in issuing certificates.

The Council record their extreme disapproval of the conduct of Dr. Har Datt Pant in making allegations quite uncalled for and unjustifiable against the Registrar.

In view of the fact that the representative of Dr. Har Datt Pant withdrew those remarks on behalf of his client, the Council decided that such should be expunged from the records of the Council.

4. The Council considered the case against Dr. Brij Kishore Kapur, M.B., B.S., and decided that the case against him be dropped.

5. Resolved that this Council disapproves of the specimen submitted by the New India Literature Co., Lahore, but has no objection to the publication of a directory on the lines of the English Medical Directory published by Messrs. J. and A. Churchill, Ltd., London.

6. Resolved that the question of employing unfair means by registered medical practitioners at the college or school examinations does not come under section 26 of the United Provinces Medical Act.

7. Resolved unanimously that the following resolution passed in June 1946 by the Madras Medical Council be endorsed:

'This Council resolves to request the Central Government to suitably amend the Indian Medical Council Act to make provision for an elected representative of each of the Provincial Medical Councils in India to serve on the Medical Council of India.'

8. The report of the Standing Committee, which met on 25th March, 1947, was discussed.

9. Disposed off in item no. 8.

10. Withdrawn.

11. The following resolution was passed:

'Resolved that the Director of Public Instruction be requested to appoint the registered medical practitioners, both graduates and licentiates, as examiners in Physiology and Hygiene in the Intermediate Examination of the United Provinces Education Board. Further resolved that the representative of this Council on the said Board be requested to press this demand in the meetings of the Board.'

12 to 15. Withdrawn.

16. Supplementary matters were not considered.

17. The resolution was referred to the Standing Committee.

R. N. SHUKLA,
Registrar.

N. BRIGGS,
COLONEL, I.M.S.,
President, U. P. Medical Council.

SAMIKSA

Journal of the Indian Psycho-Analytical Society

WE have received a copy of the first issue of the *Samiksa*, a new Indian Psycho-Analytical Periodical to be published quarterly. The journal is obtainable by subscription only, the annual subscription being Rs. 16 (inland) and Rs. 18 (overseas). All communications should be sent to the Indian Psycho-Analytical Society, 14, Parsibagan Lane, Calcutta 9.

THE WILLIAM GIBSON RESEARCH SCHOLARSHIP FOR MEDICAL WOMEN

MISS MAUD MARGARET GIBSON has placed in the hands of the Royal Society of Medicine a sum of money to provide a Scholarship in memory of her father, the late Mr. William Gibson of Melbourne, Australia. The Scholarship is awarded from time to time by the Society to qualified medical women who

are subjects of the British Empire; and is tenable for a period of two years, but may in special circumstances be extended to a third year. The next award will be made in October 1947.

In choosing a Scholar the Society will be guided in its choice either by research work already done by her, or by research work which she contemplates. The Scholar shall be free to travel at her own will for the purpose of the research she has undertaken.

There is no competitive examination, nor need a thesis or other work for publication or otherwise be submitted. The Society has power at any time to terminate the Grant if it has reason to be dissatisfied with the work or conduct of the Scholar.

Applications should be accompanied by a statement of professional training, degrees or diploma, and of appointments, together with a schedule of the proposed research. Applications must be accompanied by testimonials, one as to academical or professional status, and one as to general character. Envelopes containing applications, etc., should be marked on top left-hand corner 'William Gibson Research Scholarship' and should be addressed to Mr. G. R. Edwards, Secretary, Royal Society of Medicine, 1, Wimpole Street, London, W.1, and be received not later than 1st October, 1947.

The approximate value of the Scholarship will be £200 per annum.

URGENT NEED OF TACKLING THE T.B. PROBLEM OF INDIA. SERIOUS SHORTAGES OF DOCTORS, NURSES AND CLINICS. HER EXCELLENCY LADY MOUNTBATTEN'S APPEAL

'THE Tuberculosis Association of India and its affiliated bodies have been doing their best to stimulate public consciousness on tuberculosis matters in this country, but the shortage of institution facilities is acutely felt. In a vast country like India, it is estimated that there should be 4,600 clinics and, even on the basis of a minimum of one bed per death the number of beds required is 5 lakhs. To staff these, 14,200 tuberculosis doctors, 50,000 nurses and 9,200 health visitors must be formed. I understand the present authoritative figures do not approach even one per cent of these, but it is hoped that collective efforts of this Association and the Government will remove these serious shortages in the future', said Her Excellency Lady Mountbatten addressing the Eighth Annual General Meeting of the Tuberculosis Association of India at the Viceroy's House on morning of 19th July.

The following is the full text of Her Excellency's speech:—

It gives me great pleasure to welcome you here to-day. Due to unforeseen circumstances, it had been necessary to postpone the meeting till this late date and I quite realize the hardship that many of you have had to undergo in travelling long distances to join in this meeting. It is gratifying to feel from your presence here what deep interest you have in the fight against tuberculosis and how generously you respond to the call of duty to suffering humanity.

TRIBUTE TO LADY WARELL

To Lady Warell, my predecessor and the late President of this Association, we all owe a deep debt of gratitude for the keen interest she took in its aims and objects and I know you will wish me to record our grateful thanks to her for her help and guidance in furthering the activities. No words of praise can express our appreciation of the outstanding work done by our Chairman—General Hay—whose deep interest in the welfare of this Association, not only as an individual but also as a medical man, is manifest in the steady progress of the work. I thank also all the other members for their unfailing support.

I take this opportunity of conveying my grateful thanks to the Central Committee for their kindness

in electing me the President of the Tuberculosis Association of India, and though in the short time that I have been here, the pressure of work has been so overwhelming that I have as yet had the opportunity of visiting only one institution actively concerned with the Association—the Model Clinic attached to the Irwin Hospital in New Delhi—with which I was deeply interested. I look forward in the months to come to associating myself more closely with the work and visiting and supporting as many of their institutions as I can.

I might mention here that my family and I have always been particularly interested and associated with work in connection with the prevention, treatment and cure of tuberculosis and it was my own grandfather who founded and endowed what is considered to be one of the finest Tuberculosis Institutions in England, indeed I believe outstanding in the whole of Europe, i.e. The King Edward VII Midhurst T.B. Sanatorium. This Institution was founded in memory of my mother, and I myself as a member of its Governing Council.

APPALLING TOLL OF T.B. IN INDIA

As you all know, tuberculosis takes in India the appalling toll of about 5 lakhs of lives every year and disables about five times that number. The misery caused by this disease, which is not unpreventable, in thousands of families—especially those in crowded and industrial areas—can more easily be imagined than said.

More stress cannot be laid on the urgency of mustering all our resources in a relentless fight against T.B. and of educating the public on the sinister potentialities of tuberculosis and how it is preventable, the chief weapons being the Clinic, Sanatorium and Hospital staffed with qualified personnel. Equally important are the care and after-care organizations, rehabilitation centres and welfare institutes and I feel that all efforts should be made to set up State legislation to aid the various philanthropic societies in their work.

MAGNITUDE OF THE TASK AWAITING

The Tuberculosis Association of India and its affiliated bodies have been doing their best to stimulate public consciousness on tuberculosis matters in this country, but the shortage of institution facilities is acutely felt. In a vast country like India, it is estimated that there should be 4,600 clinics and, even on the basis of a minimum of one bed per death the number of beds required is 5 lakhs. To staff these, 14,200 tuberculosis doctors, 50,000 nurses and 9,200 health visitors must be found. I understand the present authoritative figures do not approach even one per cent of these, but it is to be hoped that collective efforts of this Association and the Government will remove these serious shortages in the near future.

At the same time it must be realized that without social awakening in this respect any amount of Government and Association work will be of little benefit. This has been amply justified by the advance made through the network of the 34 Provincial and State Branches in India, and I am sure that all-out efforts will be made in future years by our Association, with the co-operation of other allied societies and backed by Government, to take greater strides towards the goal.

SOME GENEROUS DONATIONS

We are deeply grateful to Haji Abdul Rahim Osman of Calcutta who at a cost of Rs. 33,000 constructed a second storey to the Women's Ward of the Lady Linlithgow Sanatorium at Kasauli and also to Mr. Khanna of the same city, whose generosity in donating Rs. 12,000 towards the construction of a Guest House in the Sanatorium premises, enabled the Association to complete the work. We are more than appreciative of the generosity of the patients, expatriates and other benefactors who have contributed over Rs. 15,000 towards our funds, in gratitude for the great service it is rendering.

In addition to the grant received from His Excellency the Viceroy's War Purposes Fund to which reference has been made in our Chairman's address, the Punjab Branch of the Indian Red Cross Society has contributed generously towards amenities of patients and helped with welfare and occupational therapy. The Association is grateful to many others, including the army authorities, who have helped us during the last year with cinema films, gramophone records, books and funds.

Your co-operation and sympathy in the activities of the Tuberculosis Association for the care and after-care of the unfortunate victims, in the education of the public and maintenance of close co-operation with other social welfare organizations will, I am sure, prove of invaluable service in the attempt to rid this great country of the dread disease.

COMMON WORK FOR NEW DOMINIONS

I am sure, however, that the thought uppermost in the minds of all of us here to-day is of the future and not of the past which bears a long record of our achievements and progress. India is on the threshold of great constitutional changes and shortly two Dominion Governments will take over from the present Government of India and our future activities will depend very largely on the programme which will inevitably be drawn up by their respective Health Departments. With future developments and increasing responsibilities of Government departments, it will, I feel, be necessary to review the entire field of work but I can assure you that whatever decision may be taken, the knowledge and experience gained by the Tuberculosis Association of India during the past eight years will be utilized to the best advantage of the peoples of both the Dominions, irrespective of political affiliations.

I thank you all for your willing co-operation in the past and feel confident that the high tradition set by this Association will be worthily maintained during the days which lie ahead.

NO VISITORS ALLOWED IN STOCKHOLM HOSPITALS

(From the *Journal of the American Medical Association*, Vol. 133, 8th March, 1947, p. 712)

THE influenza epidemic in Sweden has reached such proportions that it has been necessary to close all the Stockholm hospitals to visitors. At first only the maternity wards were forbidden territory, but with the ever increasing number of cases of influenza throughout the town it was felt imperative to extend the regulation to all hospitals for an indefinite period. A chief contributing reason to this has been the fact that many members of the hospital staffs are themselves down with influenza at a time when the full personnel is hardly able to keep up with their work. Keeping visitors away means more time for them to attend to their duties and every minute is needed. Most establishments with large numbers of workers have been badly hit by the epidemic. The Stockholm Municipal Street Car Company, for instance, had almost half of its drivers absent last week, necessitating warnings that the number of cars in service might have to be reduced. Since the cars are now dreadfully overcrowded, long suffering Stockholmers will have even worse traffic conditions to struggle with. Many companies are now experiencing the highest rates of absence due to illness in the histories of the concerns.

THE INDIAN MEDICAL SERVICE

(Abstracted from the *Lancet*, 5th July, 1947, p. 28)

SPEAKING at the annual dinner of the Indian Medical Service in London on 12th June, Lieut.-General Sir Bennett Hance, medical adviser to the Secretary of State for India, said that the forthcoming transfer of control would mean that the careers of some 500 I.M.S. officers would be prematurely ended. Three courses are,

he said, open to European officers, of which the first and third are open also to Indian officers: (1) to continue in the service of the new government or governments under existing terms, this being contingent, for European officers, on an invitation to do so; (2) if individually suitable and in certain age-service groups, to transfer to the medical service of one of the Armed Forces, or to the Colonial Medical Service; or (3) to retire on the proportionate or other pension earned under the existing rules, plus the amount of compensation laid down in the white-paper published last April.

Of the service's work for humanity history can speak: the service's work for humanity history can speak: the vector of malaria was discovered and its transmission proved by an officer of the I.M.S.; another I.M.S. officer dead-headed with the sister service in the discovery of the parasite of kala-azar, while the discovery of its vector and the final definition of its transmission is the achievement of yet another; cholera was robbed of half its terrors and three-quarters of its mortality, the treatment of amœbic dysentery was established, and the therapy of leprosy was advanced by the work of a single officer of the service; the foundations of surgery of the prostate gland and of modern plastic surgery were laid by I.M.S. officers; while their contributions to ophthalmology are common knowledge.

History provides no parallel of a service 'at once civil and military, political and penological, educational and executive, preventive and curative'. Alone of all the great administrative services, the I.M.S. was fully prepared to hand over; it bequeaths to India its two lineal descendants—the provincial civil medical services and the young but efficient Indian Army Medical Corps. It leaves, too, a highly organized independent medical profession of over 45,000 doctors, most of whom were taught by I.M.S. officers. The service can justly claim to share with Wren the proud epitaph, 'Si monumentum requiris circumspecte'.

U.P. PROVINCIAL MEDICAL CONFERENCE

A MEDICAL surgical exhibition is going to be organized in connection with the next U.P. Provincial Conference to be held at Basti, U.P., in the beginning of November 1947. All those intending to put up their products, specialities, etc., for exhibition must correspond immediately to

K. L. Srivastava, M.A., B.S.,
Basti, U.P.

The Indian Medical Gazette Fifty Years Ago

I.M.S. DINNER IN LONDON

(Reprinted from the *Indian Medical Gazette*, Vol. 32, July 1897, p. 262).

A CORRESPONDENT sends us the following interesting communication on the subject: The first annual dinner of the Indian Medical Service in England took place on 20th May at the Café Monico, London, and was in most respects a great success. The combined prevalence of plague and famine in India, by stopping the furlough of most, accounted for the comparatively small number of men on the active list that were able to avail themselves of the opportunity. Seventy-six members of the Indian Medical Service were present, and of this number no less than 45 were on the retired list.

It is gratifying to observe the great interest which these latter take in the Service and its prospects, for many attended at some inconvenience; some coming from the extreme north of Scotland, others from Ireland, etc., and coming for the occasion only, out of pure *camaraderie*; and it was a pleasure, and indeed an encouragement, to such, as are still in the Service, to observe the ruddy hue of health on the faces of almost all of the retired, many of whom were old veterans that had distinguished themselves in the mutiny; others had been well-known administrators, while some few had served all humanity, by advancing the science and practice of surgery and medicine, etc. The Service had the honour of entertaining the following guests: Lord George Hamilton, Secretary of State for India; Sir William MacCormac, President of the Royal College of Surgeons; Sir J. Diek, Director-General of the Navy; Surgeon-General Jameson, Director-General of the Medical Staff; Mr. Ritchie, Dr. Dickinson, Mr. Reginald Harrison and Mr. Sprigge. To the regret of all Lord Lister was prevented by a previous engagement from attending, while Mr. Dawson Williams, of the *British Medical Journal*, we were sorry to learn, was prevented by illness from coming.

The dinner was organized by an influential committee in London, and they had the great advantage of securing as its secretary, the services of Mr. Freyer, who, all his brother officers will be glad to know, is successfully carrying on in London the branch of surgery which he advanced and practised with such distinction in India. Sir Joseph Fayrer presided on the occasion, and discharged his duties in a manner that seemed to give satisfaction to all. As president he proposed, in separate toasts, the healths of the Queen-Empress and of the Prince of Wales and other members of the Royal Family, introducing each toast by a few remarks testifying to the good work of the Queen and various members of the Royal Family, and to the feelings of gratitude and loyalty with which they were recognized; this seemed especially appropriate this year, and to voice the feelings of all present.

The next toast of the evening was 'The Indian Medical Service' which was proposed in suitable terms by Sir William MacCormac, President of the Royal College of Surgeons, and was responded to by Sir Joseph Fayrer, who both acknowledged the recognition accorded to the Service by the eminent proposer of the toast, and was also able to supplement, from his intimate knowledge and long service, the references of the previous speaker, and as this was an inaugural dinner it was quite befitting, not only to sketch out the good and important assistance which the Service has rendered to the State in developing and consolidating the Indian Empire, but also to dwell with pardonable pride on the early beginning and traditions generally of the Service, which all tried to foster *esprit de*

corps, and to encourage and maintain the prosperity of the Service. He referred to the important part which had been played in the early days of the Company by Broughton and Hamilton; in recognition of their professional services to native potentates, the one had obtained concessions of territory for his company forming another important starting point, from which British rule rapidly extended over Bengal; while the other, by popularizing the advance of the British sway did much to smooth over difficult and delicate negotiations, which led to important results. The speaker then went on to show how much the Service had done, in times well within the memory of all, not only in advancing surgery and medicine, but in starting and developing other departments which are now important factors in the Government of India. In this connection special stress was laid on the important part which Dr. O'Shaughnessy and his experiments had played in starting the Telegraph Department in India. The speaker further enumerated the names of many who had distinguished themselves in the most various directions, but space forbids my giving further details. I will only add that Sir Joseph Fayrer expressed surprise that somebody had not written a book on the Indian Medical Service; and in these days, when books are written on such very small provocation, it is indeed a wonder that some historian has not arisen to put together the chronicles of a service whose origin and development are so intimately interwoven with that of the spread and establishment of British influence over India; the material at hand is ample for such a work, which would be interesting, not only to members of the Service, but to all that are interested in India. The next toast was the 'Sister Services', which was done justice to, and at the last moment by Surgeon-General Rice, who referred to both in appropriate terms. Sir J. Diek responded for the navy, expressing pleasure at the references made to it, and in an amusing way sketching and exemplifying various developments and advances that had occurred in the navy. Surgeon-General Jameson then responded for the medical staff, and after stating that what advanced the interests of his own branch of the Service also advanced those of the Indian Medical Service, proceeded to enumerate certain disabilities under which the medical staff laboured, explaining that some had been removed, and that others were under consideration, and adding that the War Office were most anxious to do all in their power to advance the interests of the Service. The health of the guests was next gracefully proposed by the President, Sir Joseph Fayrer, who referred to all in detail, giving special prominence to the guest of the evening, Lord George Hamilton, who, as Secretary of State for India, had, for several months past, been grappling with three most important evils that were affecting the health and prosperity of India, *viz.* (1) famine; (2) plague; (3) the injurious effects produced

on the health of the army by the increased prevalence of venereal disease. He referred to the successful way in which the first two were being confronted, and confidently anticipated that success would attend the proposed legislation for mitigating the third evil.

In replying for the guests, Lord George Hamilton spoke to the following effect: He acknowledged, on behalf of all the guests, the great pleasure it had given them to take part in so interesting an occasion as the inaugural dinner of a series of annual dinners to be held by a service which had always done such important work, and he added for himself that he had been very pleased at being able to attend. His Lordship said that everything had conspired to make the occasion a success: the dinner had been excellent, and they had listened to some most interesting speeches; for his own part increasing knowledge and experience had always rendered him somewhat sceptical about 'traditions', but he had great pleasure in acknowledging that officers of the Indian Medical Service had generally acquitted themselves with credit in the discharge of the very varied duties that had fallen to their hands—duties that were often quite outside the scope of their profession; but he specially recognized and did justice to the work that had been done by the Service in advancing science, and in its capacity as a medical service, commenting on its humanizing effects, and the assistance that it had done in developing and consolidating the Indian Empire; in illustration of which he stated that he had been informed on good authority that the dispensary on the Gilgit frontier had done signal service in reconciling the inhabitants to the new order of things, and that, in exercising generally a tranquilizing effect on the border, it was at least equal to another battalion of troops; and he further added that the statement in the last annual report that 19 millions of people had received relief from the dispensaries throughout India, was some measure of the benefits conferred on the people of India by the Indian Medical Service. He then went on to say that the president had referred to three great evils which had engrossed his attention for several months, *viz*, famine, plague and the disastrous effects of certain diseases on the health of the army. With regard to the first, he said that the Indian Medical Service had considerably contributed to the difficulties of the Government of India by so improving the sanitary condition of India that the population had increased in ten years by 50 millions, or by rather more than the population of the United Kingdom (laughter). With regard to plague, he gladly recognized the great services which had been rendered to the Government of India by the Indian Medical Service, and rendered so promptly and with such willingness on all sides; an instance of which had come to his notice the other day, in the case of an officer on leave, who had just been married, and who, on learning

that his services might be required in connection with the plague, had immediately without demur left his bride, promptly responding to the call of duty. It is difficult, he added, to overestimate the success of the medical profession, in assisting to check the spread of that plague, and in their endeavour to elucidate the mysteries that lie at its root; and in this task the doctors of other nations were also contributing: he had been amused to hear that French and German savants were renewing their struggles with great zeal, not over Alsace and Lorraine, but in Bombay, where they were wrangling over opposite views in connection with the bacillus of plague. With regard to the third point, *viz*, the effect of certain diseases on the health of the army in India, he was glad that a marked change in public opinion had enabled them to re-examine this most difficult and delicate question under more favourable circumstances, and he trusted that the evil would be mitigated by the measures that are at present under consideration. He fully recognized the great importance of the subject from every point of view, and that our very dominion in India must depend on the efficiency of our army, and he anticipated much from the judicious co-operation of all in diminishing this great evil. In conclusion, His Lordship reiterated the great interest he took in such an important service, which he felt sure would in the future continue to maintain its prosperity and traditions.

The health of the president was then proposed by Surgeon-General Cunningham, who referred to various points in his distinguished career, and after a few words of acknowledgment from Sir Joseph Fayer, the party soon broke up, all agreeing that the dinner had been a great success.

This annual gathering of the Service may be useful for other than mere convivial purposes; and it is to the interest of the Service that some organization for these annual meetings be definitely fixed on, so that their success may not be endangered by the chapter of accidents. To bring the committee more in touch with the Service, it would be expedient to appoint a Standing Committee composed of influential retired members, whose number should be added to, by selecting year by year from amongst those that are on furlough, a certain number to sit on this committee.

LONDON LETTER

(*Indian Medical Gazette*, Vol. 32, 1897, p. 268)

LONDON is going distracted over the Queen's Diamond Jubilee. The route by which the procession is to proceed is being built up on each side by a succession of scaffoldings and stagings, which are at present supremely ugly, but will, no doubt, when draped with scarlet, decorated with flags and loaded with well-dressed people, present a very splendid spectacle. The prices that are being charged for seats, windows and

rooms are enormous. St. George's Hospital, which commands a very favourable view of the procession, erected several blocks and tiers of seats, the best of which were promptly let for 20 guineas a piece. The profits of this transaction go to the support of the charity. Other hospitals and churches on the line of route have gone in for a similar means of replenishing their coffers. This is quite legitimate and consistent with the general spirit of philanthropy and charity which, at the suggestion of the august personage in whose honour the celebration takes place, underlies all commemorative schemes. But an immense amount of speculation is being carried on and extensive attempts to turn the exuberant loyalty of the nation and capital city to private profit. Syndicates and bureaux have been started which have purchased spaces and houses for erecting stands, houses have been bought for conversion into seeing places on condition of demolition and re-erection, persons who are fortunate enough to have houses or shops on the line of procession have made handsome sums by the letting of balconies and windows and roofs. There will be a rare scramble for money all round. Hotels and lodging-houses are demanding absurd rents for rooms. Carriages of every description will be let at a huge premium, and prices will for the time go up all round. It is a splendid opportunity for the labourer, the artisan and the tradesman. The railway companies are advertising excursions at ridiculously low rates to and from London, and the 22nd of June will be a very memorable day in the annals of London, and indeed in British history. The occasion will not be devoid of risk to life. There will be, according to all anticipation, a dense, eager excited crowd. Woe to the short of stature, the very young and very old, the feeble of heart and lung, the stumbler or fainter. The terrible experience of the Coronation crowd of Moscow is suggestive of very unpleasant contingencies, should Police precaution fail and the crowd for any reason get out of control. Then there is the danger of overloaded stands. The County Council has taken special thought against this risk, and no stand has been erected for which licence has not been sought and granted, and no licence has been given without satisfactory guarantee of strength and stability, and above all there is the fear of fire. So much combustible material has been accumulated, and so much carelessness is habitually exercised in checking about smouldering matches and the stumps of cigars and cigarettes. Even the illumination which will be lighted up at night along the principal thoroughfares will be a source of concern and dread. Special arrangements are being made in view of the great peril. Firemen are to be stationed at regular intervals all over the town and engines kept ready for use at all depots. The flood of Jubilee literature which is being let loose is appalling. The history of the last 60 years is being written and illustrated *usque ad nauseam*.

The medical and surgical events of the period will be chronicled in full detail in special numbers of the leading journals. The *Practitioner* has already published its Jubilee number, and the weekly journals are preparing theirs. The May number of the *Nineteenth Century* contains a very instructive retrospect of 'the progress of medicine during the Queen's reign', by Mr. Malcolm Morris, F.R.C.S. (Ed.). The items of progress which Mr. Morris chiefly dwells upon are neurology, laryngology, otology, bacteriology, anæsthesia, antiseptics, ovariectomy, the radical cure of hernia, brain, lung and abdominal surgery, litholapaxy, the reduction of puerperal and other septic fevers in hospital, the ophthalmoscope, laryngoscope, sphygmograph, clinical thermometer, Röntgen photography, and many other aids to diagnosis, specialism as a development in study and practice, and the great revolution which has taken place in the theory and practice of therapeutics from the days of blood letting calomel and saline purgatives to the days of germicides, antitoxins and animal juices and extracts. In fact a radical change has occurred during the Victorian era in pathology and praxis, and the change has been towards the better understanding of the nature and disease processes and thus more rational management. The era has also witnessed the rise and rapid advance of preventive medicine. This constitutes one of its principal glories, and there has been a great reduction of sickness and mortality resulting from more enlightened and efficient arrangements for the preservation of public health. Nor has India stood still during this period. Medicine and surgery have kept pace with European progress, and in many matters great activity, almost amounting to revolution, has been manifested. The development of medical education has been rapid and successful. The multiplication of charitable hospitals and dispensaries throughout the Empire very remarkable; and sanitation, though still backward, has been established on a firm and progressive basis. A medical profession has been created which is gradually feeling its way to organization; the mortality of the European army has been reduced from 70 to 15 per 1,000, and of the Native army from 18 to 15; and jail mortality, though still excessive, has been reduced. Vaccination has been extended and systematized, and the larger cities and towns have executed great works of water supply and drainage which have had an excellent influence on the health of their inhabitants. These and other events will no doubt be mentioned with thankfulness in reviewing the incidents of the longest and most brilliant British reign.

The first annual dinner of the Indian Medical Service was a great success. Some eighty members of the Service sat down to an excellent entertainment at the Café Monico. Sir Joseph Fayrer presided with his wonted ability and suavity. The toast of the evening was proposed

by Sir William MacCormac in happy terms, and in responding to it Sir Joseph Fayrer gave a most interesting sketch of the history of the Service and alluded in an appreciative manner to the achievements in science and literature of the many able and distinguished men who have from time risen above the level of their fellows and contributed to earn for the Indian Medical Service the great reputation which it has gained

for capacity, industry and skill. Lord George Hamilton made an excellent speech in responding for the guests. He commented on the three great anxieties of his administration—famine, the plague and the excessive prevalence of venereal disease in the European army of India. On each of these subjects he made some interesting and sensible remarks. This dinner will now become a permanent annual function.

Current Topics, Etc.

Vitamin B₁ (Thiamin) Content of Indian Foodstuffs

By M. SWAMINATHAN

(Abstracted from the *Indian Journal of Medical Research*, Vol. 34, October 1946, p. 289)

1. The vitamin B₁ content of about 150 common Indian foods has been determined by the thiochrome method.
2. Of the foods tested, dried brewer's yeast, rice polishing (from raw paddy) and wheat germ are rich sources of thiamin.
3. Among the cereals, whole cereals, e.g. whole wheat, millets, whole barley, unmilled rice and oats, are good sources containing 3 to 4 times as much thiamin as milled cereals, e.g. white flour, pearl barley and raw milled rice. Parboiled milled rice contains two to three times as much thiamin as that present in raw milled rice.
4. All dried pulses are good sources of thiamin. The common nuts and oil-seeds (with the exception of coco-nut) are also rich sources.
5. Cow's and buffalo's milk, eggs and flesh foods are fair sources; lean pork is a rich source.
6. Fresh vegetables (with the exception of green peas) and fruits are poor sources of thiamin.

The Supraspinatus Syndrome

By J. R. ARMSTRONG

(Abstracted from the *Lancet*, i, 18th January, 1947, p. 94)

CODMAN pointed out that lesions of the supraspinatus tendon and subacromial bursa were the commonest cause of pain in the shoulder.

The *mechanism* by which the syndrome is produced is simple. In the middle range of abduction of the humerus the supraspinatus tendon, with its covering bursa, impinges against the overlying acromion. When a lesion of tendon or bursa exists, this pressure causes pain, and reflex muscle spasm accompanies any movement that tends to bring the lesion into contact with the acromion.

The *cause* of most lesions appears to be trauma—usually a single contusion but occasionally repeated minor injuries. The typical history is of force applied to the abducted arm.

Symptoms and signs.—

(1) Aching of the shoulder usually referred to the insertion of the deltoid, but often of a much wider distribution. Pain may be referred to the whole of the outer side of the arm and dorsum of the forearm, or even to the neck. This widely referred aching pain is very real and, if this fact is not recognized, the surgeon may be misled or may unjustly suspect the patient of exaggerating his symptoms. Another almost constant feature is that the aching is most severe on sitting down and in bed at night, and is less troublesome while the patient is up and walking about.

(2) Painful arc of movement. This finding is one of the most distinctive features of the syndrome. The painful arc is somewhere between 60° and 120° of abduction and forward flexion; the exact site and area vary a little, as does the severity of the pain.

(3) A sharp stabbing pain on any start or sudden movement of the arm. This is referred to the region of the subacromial bursa and is probably due either to a sudden contraction of the supraspinatus or to a sudden jarring of the lesion against the acromion. This unexpected sharp pain is one of the most annoying and troublesome features of the syndrome.

Some degree of reversal of the normal scapulo-humeral movement is constant. Instead of the normal humeral movement throughout the first 90° of abduction, scapular movement takes place as soon as the painful arc is approached, and the whole shoulder is typically raised. It is often possible to localize a deep tenderness quite sharply to the area of the subacromial bursa.

There may be true limitation of movement. This greatly complicates the clinical picture and makes diagnosis difficult. The cause of a true limitation of movement is probably disuse.

Treatment.—Many different methods of treating the supraspinatus syndrome have been described. In the present series many of these measures were of doubtful value. Broadly speaking, treatment can be divided into conservative and operative. The following measures were used in the conservative treatment: Rest, active exercises, injection with local anesthetic, radiant heat and short-wave diathermy and manipulation of the shoulder.

ACROMIONECTOMY

About a third of all patients was unaffected or only partially relieved by any form of conservative treatment. In these circumstances I excised the acromion. This procedure, first suggested by Watson-Jones, removes pressure on the tendon and bursa and permits a full range of painless movement. Relieved of repeated irritation the lesion of the tendon or bursa tends to heal or resolve.

There is one important contra-indication to operation—true limitation of shoulder movement. In those cases in which disuse has led to a true limitation of movement of the shoulder-joint operation should not be undertaken before a full range of passive movement has been restored. Active exercises, if necessary a gentle manipulation followed by exercises, should be persisted with until all adhesions have been broken down.

Leprosy and Cockroaches

By C. J. WILSON

(Abstracted from the *East African Medical Journal*, Vol. XXIII, December 1946, p. 385)

THE author makes a plea for an extensive study both in the laboratory and in the field based on the recent hypothesis of Moiser regarding the rôle of cockroaches

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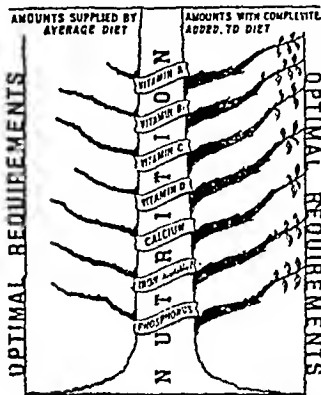
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1. Vogt-Moller, P., Tier, Rund., 1942, 48.

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Fig. 2

November 11th, 1941.—The pedicles divided.

February 24th, 1942.—A bone graft was inserted.

June 26th, 1942.—An acromio-thoracic tube pedicle was raised.

July 22nd, 1942.—The pedicle lengthened.

July 31st, 1942.—The pedicle attached one end.

September 24th, 1942.—The pedicle attached the other end.

February 2nd, 1943.—A further bone graft was inserted with Gypsona P.O.P. headcap and plaster between each pair of pins.

October 20th, 1943.—Chin dimple made.

The details and illustrations are of an actual case. T. J. Smith & Nephew Ltd., of Hull, England, manufacturers of Elastoplast and Gypsona, publish this instance typical of many in which their products have been used with success.



Fig. 3



Fig. 1

Agent : RALPH PAXTON, 10, Lall Bazar, CALCUTTA.

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in the transmission of leprosy. He sets out the evidence which Moiser has produced in favour of the hypothesis as follows:—

1. Cockroaches collected from huts where lepers live often contain acid-fast bacilli resembling Hansen's bacillus.
2. Cockroaches collected elsewhere have not been found to contain similar bacilli, except very occasionally in native huts from which leprosy had not been reported.
3. Africans are frequently bitten by cockroaches.
4. Hansen's bacillus has been repeatedly recovered from the sites of cockroach bites in lepers in whom the bacillus had not previously been demonstrable.
5. Cockroaches fed on lepromatous material pass acid-fast bacilli in their faeces.
6. Cockroaches fed on such faeces themselves in turn pass similar bacilli.
7. In dried cockroach faeces these bacilli remain apparently unchanged for many months.

D.

Tularaemic Pneumonia : Treatment with Streptomycin

By R. L. PETERSON

and

R. R. PARKER

(Abstracted from the *Public Health Reports*, Vol. 61, 23rd August, 1946, p. 1231)

A case of tularaemic pneumonia is described in which treatment with streptomycin was started immediately following diagnosis on the eleventh day of illness.

CASE REPORT

S. M. H., a 29-year-old white male employee of the Rocky Mountain Laboratory of the United States Public Health Service, became ill on the afternoon of 23rd February, 1946. The onset was sudden, beginning with a chill, followed by fever, sweating, and headache. Fever, malaise, sweating, and pain in back of the eyes persisted. Cough, together with pleuritic pain, appeared on the fourth day after onset. Sputum was scant. Physical signs were not numerous, consisting of a few scattered rales throughout the left lower lung field. The temperature ranged from 99.0°F. to 104.0°F. during this time and was spiked in character. There was no photophobia, no arthralgia, and no myalgia other than lumbar aching on the day of onset. There were no skin lesions.

On 1st March, 1946, the patient was hospitalized. Chest x-ray showed diffuse infiltration of the lower lobe of the left lung. The white blood count was 9,600, with an essentially normal differential count. There was scant watery sputum without haemoptysis. The urine contained albumin and granular casts. Fifty thousand units of penicillin were given intramuscularly, followed by 25,000 units every 3 hours.

The course remained febrile, the temperature reaching 104.2°F. or more daily. Roentgenogram of the chest on 3rd March showed more extensive and dense infiltration in the left lower lobe. On 6th March, dullness and diminished breath and voice sounds were noted posteriorly in the left lower chest. A roentgenogram on 8th March confirmed the diagnosis of atelectasis of the left lower lobe, with displacement of the heart and trachea to the left.

On 6th March, the diagnosis of tularaemic pneumonia was established by laboratory tests. Penicillin was discontinued and streptomycin hydrochloride was administered intramuscularly, 50,000 units every 3 hours for 18 doses. This exhausted the available supply.

Three days later a supply of streptomycin sulfate (Abbott Laboratories) was received through the courtesy of Chester S. Keefer, chairman of the committee on chemotherapeutics, and other agents of the

National Research Council. On 11th March, streptomycin therapy was resumed. The same dosage schedule previously employed was instituted and a total of one million units was administered.

The patient's response to streptomycin was dramatic. The drug was first administered at 4 p.m. on 6th March; the patient's temperature was 104.4°F. at 10 p.m., but by 4 o'clock the next morning it was normal and remained so except for one rise to 99.0°F. on 8th March. The pulse rate dropped from 90 and 100 to 60 and 50, and the respiratory rate likewise decreased. All subjective symptoms disappeared within 24 hours after the initial dose of streptomycin. Cough diminished, and a roentgenogram of the lung made on 13th March showed the atelectatic lobe to be reinflated. The patient was able to sit up on 12th March and was discharged from the hospital on 15th March. He had lost 29 pounds during his illness.

The patient was able to return to work on 1st April, 37 days after onset and 25 days after the initial dose of streptomycin. He gained weight rapidly. A chest film on 22nd March still showed dense diffuse infiltration of the left lower lung, although there was no cough. Another film on 26th April showed resolution to be nearly complete.

Headache

By Sir CHARLES SYMONDS

(From the *Guy's Hospital Gazette*, Vol. 60, 3rd August, 1946, p. 202)

HEADACHE is a common symptom but it is only in the last few years that we have had any clear idea of its mechanisms. There have been three main sources of information.

First there has been the opportunity during operations on the head under local anaesthesia of observing which structures are sensitive to pain. From such observations it has been shown that all the tissues covering the cranium are pain sensitive and especially the arteries. The cranium itself is insensitive, that is to say, that after the periosteum has been stripped the skull can be drilled or sawn through without the patient being aware of any sensation except the noise. Of the intracranial structures most of the dura mater, all the pialaroid and the brain substance are insensitive. The parts of the dura which are sensitive are those which cover the base of the skull, and the tentorium. Pressure upon the latter structure causes pain which is referred to the brow on the same side of the head. The falx, on the other hand, appears to be insensitive to pressure. Although the dura itself is insensitive except at the base, the larger dural arteries are everywhere sensitive; for example, crushing the middle meningeal artery causes pain. Traction upon the walls of the large venous sinuses and their main tributaries also causes pain and so does traction upon the large arteries at the base of the brain. Stimulation of the sensory nerves intracranially, the fifth, ninth, tenth and second cervical, causes pain of appropriate distribution.

It is to be noted that with the exception of the arteries and the sensory nerve trunks, all the pain sensitive intracranial structures play an important part in anchoring the brain to the cranium.

The second source of information is from the experimental production of headache. The intravenous injection of 0.1 mg. of histamine causes in most subjects a headache having the following characters. It begins one minute after the injection, reaches its maximum intensity half a minute later and gradually passes off in about ten minutes. It is of a throbbing nature and of generalized distribution. The effect of this injection of histamine upon the general circulation is as follows:—Within twenty seconds there is flushing of the face with a fall of blood-pressure. The fall of blood-pressure lasts for less than a minute, so that the headache begins when the blood-pressure is returning to normal and reaches its maximum intensity later.

It is known that histamine also causes dilatation of the arteries of the meninges and on the surface of the brain. This in turn leads to an increased volume of the intracranial contents and a rise in the cerebro-spinal fluid pressure. It is not, however, until the C.S.F. pressure has almost returned to its normal level that the headache begins. The headache, therefore, cannot be due to an increased intracranial pressure. This is further shown by the fact that histamine headache can be relieved by raising the C.S.F. pressure either by compressing the jugular veins or by the intracranial injection of normal saline. Histamine headache can also be temporarily relieved by a second injection of histamine or by the inhalation of amyl nitrite, the relief being coincident with the fall of blood-pressure caused by these drugs.

Thus it appears that histamine headache is relieved by increasing the pressure outside the walls of the intracranial arteries or by diminishing the pressure within them. This suggests that the headache is due to stretching of the arterial walls and a further clue to the sequence of events after histamine injection is provided by the observation in animals that the dilatation of the cerebral arteries continues for a short time after the arterial pressure has begun to return, so that the walls of these vessels not yet having regained their tone may be abnormally stretched by a normal internal pressure.

These observations and conclusions have been described in some detail because they have been the basis of much other work. They were made originally by picking in this country and confirmed by Wolff and others in America.

It has been shown that the headache of experimentally induced fever can, like histamine headache, be temporarily relieved by artificially raising the C.S.F. pressure; and by an ingenious method of recording the pulsations in the C.S.F. manometer, which reflects the pulsation of the intracranial and intraspinal arteries, it has been demonstrated that the onset of febrile headache is associated with an increased amplitude of pulsation, and that fluctuations in the intensity of the headache are associated with corresponding fluctuations of amplitude. It would appear, then, that the headache of fever is caused by an abnormal degree of stretching of the arterial walls, and since raising the intracranial pressure by injection of saline into the theca will relieve the headache, we may conclude that the arteries chiefly concerned are those within the skull.

Another experimental headache is that which may be produced by the withdrawal of 20 c.c. of C.S.F. by lumbar puncture. With this kind of headache we are familiar as an occasional sequel of diagnostic lumbar puncture when it is due to excessive leakage of C.S.F. This headache is remarkable for its constant relation to posture. It is relieved by the horizontal and aggravated by the erect positions. It must be due to a diminution of cerebro-spinal fluid, for the liability to headache in the erect posture can be very much reduced by making good the deficit with normal saline. It is, however, temporarily increased by jugular compressions which raises the intracranial pressure, so that it is incorrect to regard lumbar puncture headache as 'low pressure' headache. It is probably due to traction upon the pain sensitive structures anchoring the brain to the skull which are stretched in certain postures owing to the depletion of C.S.F. which normally provides a water-bed for the brain. The great venous sinuses and their tributaries and the tentorium might be especially liable to be affected in the erect posture.

Our third source of information about the mechanism of headache is observation in disease. In migraine the headache is of a throbbing character, resembling in this respect that induced by histamine or fever, and it might reasonably be expected to have the same basis, an abnormal degree of stretching of the intracranial arteries. But the headache of migraine is not relieved by raising the C.S.F. pressure. This, together with the clinical observation of increased pulsation of the temporal artery on the same side as the headache in

migraine, led to observations designed to show the relation of the amplitude of pulsation in this artery to the intensity of headache. The device for recording temporal pulsation also afforded an opportunity for observing the relation between this and the effect of ergotamine tartrate which was already known to relieve migraine headache. The result was striking. There was a constant parallelism between the amplitude of pulsation in the temporal artery and the intensity of headache on that side, and the intravenous injection of ergotamine tartrate simultaneously effected—(1) a rise of systemic blood-pressure due to general vasoconstriction; (2) a decrease of amplitude in the pulsation of the temporal artery due to local vasoconstriction; (3) diminution and eventually relief of headache.

It may be concluded that the pain of migraine is caused by dilatation and distension of cranial arterial walls and that the therapeutic effect of ergotamine tartrate depends on its ability to produce prolonged and powerful vasoconstriction.

That the headache of migraine is related to the stretching of extracranial arteries has also been shown in other ways. Pressure on the common carotid artery during an attack of migraine reduces the severity on that side and at the same time reduces in rough proportion the amplitude of pulsation in the temporal artery. When the headache is strictly unilateral, as it often is, carotid compression on the side of the headache greatly relieves it.

Ligature of the temporal artery in certain cases of migraine has given freedom from pain in this area in subsequent attacks. Thus it seems certain that stretching of the extracranial arteries is the most important source of pain in migraine, but this does not exclude stretching of the intracranial arteries as a contributory cause. In fact, there is positive evidence for this, for we know that the classical visual aura of migraine is due to disturbance of cortical function, and must therefore have an intracranial cause and, in a few cases of migraine with severe deep-seated temporal pain, ligature of the middle meningeal artery is reported to have given relief. The mechanism of migraine headache described offers an explanation of the not very uncommon occurrence in some attacks of pains in face or neck, which may be attributed to distension of the arteries in these regions.

Headache is a common but inconstant symptom of arterial hypertension, excluding consideration of the relatively rare condition known as hypertensive encephalopathy in which headache is severe and is associated with a raised C.S.F. pressure. Clinical observation shows that when headache is a prominent and frequent symptom, the patient has usually had a lifelong liability to headache under circumstances of fatigue and stress, that these are the precipitating causes of his present attacks, and that there is no relation between the attacks of headache and the height of the blood-pressure. The headaches of arterial hypertension appear to have much the same basis as those of migraine. They are not relieved by increasing the intracranial pressure, they are associated with an increased amplitude of pulsation in the extracranial arteries and they can be locally relieved by ligature of a temporal artery. Furthermore, an attack of headache can generally be relieved by an injection of ergotamine tartrate. This last observation is of especial interest, for the injection causes a rise of blood-pressure. Here is additional proof that a raised blood-pressure alone does not cause headache. The explanation offered for hypertensive headaches is that variations in the tone of the walls of the cranial arteries are common, and commoner in some persons than in others. If the blood-pressure is high, a relaxed artery will be more stretched, and so the liability to headache will be increased and the pain will be greater.

The headache of intracranial tumour was for a long time supposed to be due to stretching of the parietal dura from increased intracranial pressure, but this explanation no longer stands. Severe headache may be

present in cases of cerebral tumour when the intracranial pressure measured by a manometer is normal. Headache may sometimes be provoked by a sudden diminution of the space occupying lesion as when a cyst is tapped. Experimentally it has been shown that in a normal man the intracranial pressure can be raised by the lumbar injection of normal saline to over 500 mm. and maintained at this level for ten minutes without causing headache. An observation by Wolff and his colleagues in a man with a left frontal glioma provides a good example of the independence of headache and increased intracranial pressure. The patient had had intermittent bifrontal headache for a month, but at the moment of observation was free from headache. Lumbar puncture gave a pressure of 175 mm. Thirty-nine c.c. of fluid were withdrawn and the pressure came down to nil. Headache, chiefly left frontal, resulted and remained until the pressure was raised to its initial level by the injection of normal saline. A further elevation of pressure to 550 mm. maintained for five minutes failed to cause recurrence of headache.

We are led therefore to the conclusion that the headache of intracranial tumour is due to traction upon or displacement of pain-sensitive intracranial structures which, as we have seen, include basal dura and arteries, meningeal arteries, the venous sinuses and their tributaries and the tentorium. Such traction or displacement may be due to the local effect of the tumour or to remote effects from herniation of brain substance beneath the falx or through the incisura tentorii, or from obstruction of the cerebro-spinal fluid circulation.

This incomplete account of recent research into the mechanism of headache will, it is expected, excite curiosity. There is certainly much more to be learned about the structures and functions concerned in the production of a symptom which is one of the commonest kinds of pain.

Milk of He-goat

By C. M. DESAI

(From the *Current Science*, Vol. 15, October 1946, p. 286)

THE writer has come across an instance of a he-goat giving milk from both the teats since last November. The maximum amount secreted was 6-7 oz., but this has considerably decreased and the output to date is only 4 oz. The goat behaves quite normally in other respects and is used for stud.

Two samples of this milk were collected and analysed. The average of these two determinations were: Fat (Gerber) 4.6 per cent; total solids (gravimetric) 14.4 per cent; solids-not-fat 9.8 per cent. This milk seems to be normal compared to the average figures reported for the milk of she-goat.

Effects of Atomic Bomb Explosions at Hiroshima and Nagasaki

(From the *Journal of the American Medical Association*, Vol. 131, 15th June, 1946, p. 598)

A DISTINCTIVE feature of the atomic bomb is the large amount of radiant energy that it produces. The chief biologic effects include the results of heat, producing thermal injuries of the flash-burn type, and results of exposure to x-rays. This radiant energy was produced in an instant. Combined with and modifying and obscuring the thermal and radiation injuries are the more usual effects of the conventional types of bombs. Air-blast injury was usually of the secondary type due to flying debris or impact against fixed structures, producing fractures and ruptures of viscera. The thermal effects were striking in their intensity considering the brevity of the period during which they occurred. Clothes, wisps of hair and even an arm gave protection to the part of the body it shadowed. The intensity of the heat and the instantaneous character of

the flash are well brought out by photographs which show the profile of blades of grass in relief against the burned background of a board bunker. The instantaneous and intense radiant heat burned the wood before the grass had time to wither or wave.

The characteristic clinical course manifested by persons who suffered from radiation injury as a result of the atomic bomb explosions included weakness, anorexia, fever and often death and appeared usually within forty-eight hours. These effects would parallel experimentally induced changes in animals and represent the syndrome of radiation sickness carried to an extreme degree. The delayed effects represented injury of the irradiation sickness type. These patients presented, in addition to weakness, anorexia and weight loss, and diarrhoea.

Eight hundred cases hospitalized and about 13,000 made available for casualty survey were studied. In the cities and villages around Nagasaki and Hiroshima the victims of radiant energy were easily apparent by the characteristic flash-burns and by the frequent occurrence of epilation. There were three chief groups of symptom complexes resulting from damage to haemopoietic tissue. The first was the leukopenic group in which infection, particularly a Ludwig's type of angina, was the chief characteristic. The great bulk of leukopenic deaths occurred during the first three weeks after the bombing. The leukocytes in the circulating blood were destroyed at the same time at which the haemopoietic tissue was damaged, so that white blood cell counts as low as 200 per cubic millimetre were found in the first few days. The second was the thrombocytopenic group. From three to five weeks after the bombing a considerable number of haemorrhagic deaths occurred as a result of the thrombocytopenia caused by radiation damage to the megakaryocytes of the bone marrow. Some persons had massive haemorrhages from various body orifices. At necropsy, haemorrhages filling the pelvis of the kidney, multiple mucosal haemorrhages of the stomach and multiple diffuse haemorrhages in the meninges or even in cerebral substance were frequently seen. The third was the anemic group. Those with serious damage to the bone marrow who weathered the first few weeks showed later manifestations of anaemia with red blood cell counts in some instances dropping to a million or below. Some bone marrows, as shown by sternal biopsy, were extremely hyperplastic, while others were aplastic. The gonadal effect was much more prominent in the testis than in the ovary. Spermatogenesis was suppressed, and frequently the tubules were represented only by Sertoli cells and thickened membranes. The interstitial cells appeared to be undamaged. Injury from residual radioactivity did not result. Persons who had entered the bombed area soon after the explosion and had remained there were without deleterious effects.

The treatment given by the Japanese was inadequate, as were their hospital facilities. Blood transfusions were not used. Little more than supportive treatment was given. Repeated blood transfusions and penicillin to control infection during the leukopenic period should have materially reduced the number of deaths.

Prostatic Cancer Treated by Orchiectomy: The Five-Year Results

By C. HUGGINS

(Abstracted from the *Journal of the American Medical Association*, Vol. 131, 15th June, 1946, p. 576)

THE early evidence of clinical improvement following orchiectomy includes (among other effects) the relief of pain, improved appetite with gain in weight, decrease of anaemia and a decrease of size and sometimes the disappearance of the primary tumour and of the metastases. In one patient there has been relief of paraplegia; similar cases have been described by Nesbit and Cummings, and by Clarke and Viets.

In the laboratory, improvements of the disease after antiandrogenic therapy may be detected through changes in the acid and alkaline phosphatase activity of serum. Kearns has also demonstrated a striking decrease in the sedimentation rate of the blood after oestrogen administration.

Five patients survive the five-year period; one man has a slowly growing tumour, while in four of these cases we have been unable to detect activity of the tumour. It is true that an occasional untreated patient with prostatic cancer will live more than five years, although in such patients the tumour does not regress but remains in a slowly growing state; an explanation for prolonged survival in some untreated cases must be spontaneous androgenic deficiency through accidental physiologic failure of androgen production.

It is still impossible to predict the course of the disease following orchiectomy at this time. With respect to the four patients surviving five years after orchiectomy and with great involution of the neoplasm, the ages range from 63 to 80 years. One patient had only moderately advanced carcinomatosis, while in two men the disease was far advanced and one patient was moribund. Therefore the extent of the lesion is not of great moment. Two factors are apparently of significance in determining the effectiveness of orchiectomy: the tumour must be androgen dependent and the testis must contribute functionally significant amounts of the total production of androgen. It has been established that human prostatic cancer may be or may become independent of androgens. This evidence is based on removal of the adrenal glands in men who have had a relapse after an orchiectomy induced remission, life being supported by adrenal substitutive therapy: here the androgens were apparently abolished as determined by the excretion of 17-ketosteroids and urinary comb growth androgens, yet the cancer followed its unfavourable course. It is known that castration does not cause the epithelial cells of the normal prostate to disappear; they merely shrink and remain functionally quiescent.

The question of supplemental therapy arises in patients with unfavourable response to orchiectomy. It can be easily demonstrated that the addition of oestrogen to a small number of patients in relapse will cause improvement, as in the following case:

J. T., aged 66, had carcinoma of the prostate with associated bright pink papular metastases over the scalp, chest, abdomen and back; orchiectomy was performed and a biopsy of one of the nodules over the sternum showed a typical prostatic adenocarcinoma which was rich in acid phosphatase when stained by the method of Gomori. One year after castration many of the nodules had disappeared but other hyperæmic papules had developed in the skin over the chest.

Diethylstilbestrol 1 mg. daily was administered by mouth. Within four days the lesions had become pale and within six weeks the lesions were flat and at this time oestrogen was discontinued. Six weeks later the lesions had reappeared in their rosy elevated form and they again became flat and pale when oestrogen was given.

The beneficial effects of oestrogen have not been prolonged nor has other agent which would greatly benefit in post-orchiectomy failure been encountered.

An important consideration of the effect of relapse after orchiectomy in disseminated prostatic cancer is the disappearance of certain metastases and reappearance of lesions in other areas. This phenomenon occurred twice in the present series. It was observed most clearly in cutaneous metastasis and in bone. Orchiectomy had apparently injured cancer cells so severely in certain areas that they did not again become active.

It has previously been demonstrated that prostatic cancer sometimes grows more rapidly in metastases in bone marrow and lymph glands than in its primary location. In the present series in 4 of the 15 fatal cases the primary neoplasm became soft and remained

clinically atrophic while the disease grew in its metastatic location to cause death.

Although the effects of orchiectomy on prostatic cancer are at times very profound and prolonged, it is premature to suggest that any of these patients has been cured.

Remissions of varying length of time occurred in 18 patients among 20 with disseminated prostatic cancer treated with orchiectomy. After five years one patient is alive with slowly advancing prostatic carcinoma and in four patients there is no clinical or laboratory evidence of cancer at the present time.

The antiandrogenic therapy of cancer of the prostate demonstrates that a chemical change in the internal environment of the host has brought about a long continuing regression of a malignant neoplastic process.

A New Type of Congenital Life-long Jaundice

By F. PARKES WEBER, M.D., F.R.C.P.

(Abstracted from the *Medical Press*, 11th December, 1946, p. 440)

THE patient enjoyed good health, had hardly ever required medical aid of any kind, and continued at work. He had scars from leg ulcers, considerable deafness (old otosclerosis), and slight nystagmus. The blood bilirubin had been found in excess in the blood serum (negative direct Hijnmans van den Bergh reaction), but the urine had always been found free from bilirubin and from excess of urobilin and urobilinogen. There had never been any anaemia or enlargement of spleen or liver. No abnormal fragility of the erythrocytes had been discovered. The jaundice had not been transmitted to any one of his four children.

He died at about the age of 80 years of pneumonia developing on a stroke of left hemiplegia.

The following data, which concern his jaundice, were amongst those noted:—

Blood count: haemoglobin 110 per cent; erythrocytes 5,820,000; colour-index = 0.95; leucocytes 24,800 (polymorphonuclears 88 per cent, lymphocytes 11 per cent, large mononuclears 1 per cent). Reticulocytes: less than 1 per cent. Erythrocyte fragility test: within normal limits. Van den Bergh reaction: the direct reaction was positive; the indirect reaction was equivalent to 6.4 mg. bilirubin per cent (normal = 0.1 to 0.5 per cent). Erythrocytes: mean corpuscular diameter 6.9 μ ; mean corpuscular thickness 2.33 μ (the normal range is 1.7 to 2.5 μ). Faeces: not 'alcoholic', but well coloured. Urine: urobilin, strongly positive; bile pigment, negative; bile salts, negative.

Necropsy showed partly organized bronchio-pneumonia, old and recent cerebral softening, congenital jaundice.

The portal systems showed no evidence of fibrosis but contained an undue number of bile ducts lined with swollen epitheliums and occasionally containing bile.

The icteric symptoms were due simply to excess of blood bilirubin in his blood. Excepting for this and the history of leg ulcers, he had none of the following features ordinarily associated with familial acholuric (haemolytic) jaundice, namely, chronic splenomegaly, excess (until the end) of urobilin in the urine, excessive fragility of erythrocytes.

One cannot now ascertain whether his production of blood bilirubin had been excessive or not, nor whether there was a damming-up of blood bilirubin in the blood (high threshold for its elimination or catabolism). It seems probable, however, that there was such a damming-up of blood bilirubin as the essential cause of the life-long jaundice. If so, one would not expect to find any microscopical structural peculiarity in the organs to account for it. Thus, in cases of familial renal glycosuria there is no evidence by microscopical examination of the kidneys, pointing to the existence of a low threshold for the excretion of sugar.

A. B. R. C.

Para-aminobenzoic Acid Treatment of Rocky Mountain Spotted Fever

By LEWIS B. FLINN, M.D.

JOHN W. HOWARD, M.D.

CHARLES W. TODD, Ph.D.

and

ELVYN G. SCOTT, M.T.

(Abstracted from the *Journal of the American Medical Association*, Vol. 132, No. 15, December 1946, p. 911)

THE use of *p*-aminobenzoic acid (PABA) in the treatment of several of the rickettsial diseases has been reported recently. The first report of a case of spotted fever treated with this drug was in 1945.

In the series of 10 patients treated with *p*-aminobenzoic acid, 9 under the age of 40 responded dramatically. The records of these patients are very striking when compared to those of 13 patients under the age of 40 who recovered without receiving *p*-aminobenzoic acid. The average number of days of fever in the untreated patients was 17.5 as compared to 10.5 for the patients given *p*-aminobenzoic acid. The untreated patients averaged twenty hospital days; those treated, thirteen days. In the treated patients there was a decided clinical improvement twenty-four hours before the temperature started to drop. The temperature of patients given *p*-aminobenzoic acid dropped rapidly to normal within two to four days after treatment was begun, whereas in the untreated patients the temperature gradually came down to normal over a period of about sixteen hospital days. Coincidental with the lowering of the temperature the rash rapidly faded, and the patient made a prompt clinical recovery. The average day of disease on admission to the hospital was 7.2 days for the untreated patients and 5.5 days for those given *p*-aminobenzoic acid. The average day of disease on which therapy was begun was 7.6 days or about the same day of disease as that on which the untreated patients were admitted to the hospital.

Para-aminobenzoic acid is known to be rapidly excreted by the body. In order to select the most favorable mode and schedule of therapy, studies were made of the blood levels and urinary excretion rates following administration of the drug in three different ways: (1) Three gm. orally in aqueous sodium bicarbonate, (2) three gm. as six 0.5 gm. tablets of the sodium salt and (3) three gm. intravenously as the sodium salt.

These results suggest that, due to its slower absorption, more prolonged and steadier levels of the drug in the blood may be obtained with the tablet form. The variations in blood content when administered by different routes probably result from individual differences in the subjects studied and may be related to the fluid balance.

In the few instances when it must be given parenterally—patient cannot retain the material by mouth or in the comatose patient who cannot swallow—continuous intramuscular drip, as suggested by Woodward, is probably the preferable method. As it is excreted rapidly when given intravenously a 25 per cent solution of sodium chloride is used. This solution is sterilized by filtration by a Seitz filter bringing the pH to approximately 7.0 by the addition of small amounts of crystalline *p*-aminobenzoic acid to the solution of sodium *p*-aminobenzoic acid before filtration.

The great majority of the cases reported had all the criteria for diagnosis—tick bite, fever, typical rash and a changing agglutination titre for proteus OX19. In a few cases the agglutination titre was not determined in the second week of the disease. In every such instance, however, the patient contracted the disease during the tick season in a locality known to be infected, and the rash was characteristic, occurring first on the wrists and ankles, then on the palms and soles and later spreading to the trunk.

Clinical studies suggest that the level of *p*-aminobenzoic acid in the blood is best kept in the optimum range of 30 to 60 mg. per hundred cubic centimetres by adjustment of dosage and fluid balance in each individual case.

The *p*-aminobenzoic acid was administered without complication.

Because of the rapid urinary excretion of the compound, oral administration at one or two hour intervals is required to maintain therapeutic blood levels.

A. B. R. C.

Full-Term Abdominal Pregnancy

By MARY KATHLEEN LAWLOR, F.R.C.S. (Edin.)

(Abstracted from the *Proceedings of the Royal Society of Medicine*, Vol. XXXIX, No. 9, July 1946, p. 575)

FULL-TERM abdominal pregnancy, occurring in a healthy young primipara, with no history of tubal rupture or vaginal losses during pregnancy, is suggestive of a primary abdominal cystitis.

The mother, aged 26, attended the ante-natal department for the first time in November 1945 at 38 weeks' maturity with a letter from her doctor stating that the foetus was lying transversely and that he had made two unsuccessful attempts to perform a version. The pregnancy had been complicated by attacks of diarrhoea and vomiting which had always been diagnosed as enteritis.

On examination, it was not difficult to decide that the foetus lying transversely in the upper abdomen was extra-uterine. There was a rounded sub-umbilical swelling which was diagnosed as the placenta and, on vaginal examination, a normal non-pregnant uterus was found lying posteriorly to the placental mass.

Abdominal section confirmed the diagnosis. A perfectly healthy female infant weighing 7 lb. 6 oz. was extracted through a rent in the mesentery. It was lying free in the peritoneal cavity with no liquor amnii. The placenta presented as a highly vascular globular swelling attached to the anterior abdominal wall and the pelvic organs, the view of which it entirely obscured. The umbilical cord was traced to the left-hand corner of the placenta where the foetal membranes were also attached.

Every effort was made to avoid separating the placenta, the vessels of which were of an alarming size, and the abdomen was closed without drainage.

The puerperium was uneventful. The wound healed by first intention. Efforts to establish lactation were unsuccessful and there was no vaginal loss of any kind until the 5th week of the puerperium when an apparently normal period occurred, but was unusual in that it persisted for five weeks. Since then normal monthly periods have taken place, but the 4th and 5th have been a little heavier than usual.

This swelling did not show any attempt to decrease in size until the 5th month. There were no signs of calcification or inflammation. The patient began to feel stronger and healthier with the decrease in size of the placenta.

The baby (6 months old at the time of report) was thriving satisfactorily and was an exceptionally bright and attractive child.

A. B. R. C.

Streptomycin Containing a Histamine-Like Factor

(Reproduced from Newsletter no. W-422, dated April 1947, prepared by the American Medical Association)

THROBBING headache, palpitation, and peripheral vasodilatation were observed uniformly in 20 young adult subjects following the intravenous administration of 50 mg. of streptomycin

containing a histamine-like factor, but a similar histamine-like reaction was observed in only 48 per cent of 23 subjects following intramuscular administration of 500 mg. of the same material. Small doses of benadryl given intravenously were effective in ameliorating these reactions to H-streptomycin. In nine fasting young adult subjects 500 mg. of streptomycin containing a histamine-like factor, administered intramuscularly, produced a significant increase in total volume of gastric secretion and the amount of free acid present.

In one asthmatic subject the intravenous administration of 50 mg. of H-streptomycin and 0.01 mg. of histamine base produced a similar degree of reduction in the vital capacity which was almost completely prevented by 30 mg. of benadryl given intravenously. In another subject essentially similar results were achieved when 0.02 mg. of histamine base was administered. Benadryl in the dosage used afforded no notable protection against the reduction in vital capacity due to acetyl- β -methylcholine chloride. These studies in man furnish further evidence that one of the contaminating substances of impure solutions of streptomycin is histamine.

(Hewitt, William L., and Curry, John J.: Pharmacodynamic Effect in Man of Streptomycin containing a Histamine-Like Factor. *J. Lab. & Clin. Med.*, **32**, 42, January 1947.)

Treatment of Multiple Sclerosis with Dicoumarin

(Reproduced from Newsletter no. W-422, dated April 1947, prepared by the American Medical Association)

THIS report is based on a study of the results of treatment of 43 patients with multiple sclerosis with dicoumarin for periods varying from six months to four years. The prothrombin time is determined before treatment is begun, twice the first week, weekly for the next month, then every two or three weeks. The dosage of dicoumarin is regulated to stabilize the prothrombin time of the undiluted plasma at about 30 seconds. If the clotting time of whole plasma rises to 40 seconds, or that of diluted plasma to more than 120 seconds, the dose should be omitted for at least four days and then begun at a lower level.

The usual initial dose is 150 mg. This is immediately cut down to 50 mg. daily until a proper prothrombin time is reached. Fifty milligrams can then be given every other day, until the prothrombin time drops below 30 seconds, when the dose is increased again. If hæmaturia occurs, administration of dicoumarin should at once be stopped and the patient put to bed. A transfusion should be given within 24 hours. In stubborn cases repeated transfusions, as many as five, have been found necessary. Administration of vitamin K, even intravenously, has not seemed to be of benefit.

Twenty-five patients suffering from a remittent form of the disease were adequately treated without interruption for a total period of approximately 61 patient years. In this group no fresh symptoms or obvious acute outbreaks occurred. Most of the 16 patients with chronic progressive disease continued in their downward course. The treatment of two patients was interrupted for one reason or another. The patients were free from new symptoms while taking treatment, but both had acute relapses when it was discontinued. In two patients large doses of dicoumarin failed to produce the expected increase in prothrombin time, and relapses occurred. The authors also reviewed the evidence that the sclerotic plaques of multiple sclerosis are a result of venular thrombosis.

(Putnam, Tracy J., et al.: Results of Treatment of Multiple Sclerosis with Dicoumarin. *Arch. Neurol. & Psychiat.*, **57**, 1, January 1947.)

Gynecomastia Due to Malnutrition

(Reproduced from Newsletter no. W-422, dated April 1947, prepared by the American Medical Association)

IN 27 cases of gynecomastia of nutritional origin, determinations of urinary 17-ketosteroids, cortins, estrogens and follicle-stimulating hormone have been made. Control studies were made on normal individuals from the military and civilian populations. In addition, cases of gynecomastia occurring in civilian life were studied. As a group, the gynecomastics showed significantly lowered values for 17-ketosteroids. Estrogens were in the low normal range. 'Cortins' were normal. No elevation of follicle-stimulating hormone was detected. The estrogen : androgen ratio was normal.

The findings distinguish this group from the gynecomastia of cirrhosis and acute hepatitis, but at the same time suggest that temporary derangement of liver function may play a prominent rôle in the pathogenesis of the lesion. A possible alternative explanation is that the pituitary-gonadic axis is primarily involved. The group was not dissimilar to certain types of gynecomastia found in the civilian population.

(Salter, William T., et al.: Gynecomastia Due to Malnutrition. II. Endocrine Studies. *Am. J. M. Sc.*, **213**, 31, January 1947.)

Chlorophyll in Wound Healing and Suppurative Disease

(Reproduced from Newsletter no. W-424, dated April 1947, prepared by the American Medical Association)

THIS paper by Bowers records his own experiences and observations as well as those of a group of over 30 officers of the surgical service of the staff of the Winter General Hospital obtained with water-soluble chlorophyll in the treatment of clean and infected

wounds. The general report covers the use of chlorophyll in over 400 clinical cases representing a variety of surgical conditions. The observations of the medical officers were compiled into the following group of opinions:

1. When using chlorophyll for infected wounds, the officers were impressed by the rapid disappearance of objectionable odours and by the remarkable cleanliness of the wound within two or three days.
2. Granulation tissue seemed to be of finer texture, more firm and to form more rapidly with chlorophyll than with other agents previously used.
3. Epithelization also appeared to be stimulated more by chlorophyll than by other agents such as penicillin.
4. No skin irritation or adverse systemic reactions have been noted and many patients have spontaneously commented that the chlorophyll wet dressing has been more comfortable than similar dressings with saline solution, boric solution or penicillin.
5. If chlorophyll is used as a wet dressing over a week or more, there is a tendency to overproduction of granulation tissue, so that after the wound is clean and odourless, it is advocated that chlorophyll ointment gauze be used instead of the wet dressing.
6. It was noted in all suppurating cases that chlorophyll caused cessation of pus formation in two or three days; and thenceforth, there was only a slight serous discharge. This includes the osteomyelitis and thoracic empyema cases which are noted for prolonged suppuration by other modes of treatment.
7. In the nose and sinus cases, the officers, some of whom used chlorophyll themselves, noted that chlorophyll gave more rapid changes in the nasal mucosa and had a quicker effect in stopping purulent drainage than other agents formerly used. All these patients have noted a freer breathing after chlorophyll instillation without the disagreeable after-effects of ephedrine.
8. All officers and patients have noted the bland qualities of chlorophyll and tolerance by the patient even when instilled into the eye, the nose, deep intra-abdominal abscess cavities and the pleural cavity.

Basic biologic data are presented from the literature and from personal research to attempt to establish a rational basis for the use of chlorophyll in clinical cases. It is to be emphasized that chlorophyll is not antibacterial and is but weakly bacteriostatic so that its beneficial effect is exerted through stimulation of the cells of the host.

The author thinks that the water-soluble chlorophyll preparations have a broad military application and that wide use is highly desirable. He does not present chlorophyll as a cure-all but is convinced that chlorophyll is the best agent now known for use in the treatment of suppurative diseases, indolent ulcers or wherever stimulation of tissue repair is desired and local application of this drug is possible.

(Bowers, W. F.: *Am. J. Surg.*, **73**, 37-49, January 1947.)

Streptomycin in Pulmonary Tuberculosis in Childhood: Results in Four Children

By HEYWORTH N. SANFORD

and

DONALD E. O'BRIEN

(Abstracted from the *Journal of the American Medical Association*, Vol. 133, 8th March, 1947, p. 691)

TREATMENT of 4 children, 7 months to 3 years of age, with pulmonary tuberculosis by the administration of 1,000,000 units of streptomycin a day for one month has resulted in defervescence in all 4, improvement in their general condition and a regression of the appearance of the pulmonary lesions in the roentgenograms. After a month of treatment with streptomycin the temperature has fallen to normal, the general condition of the child has been bettered and the roentgenograms have shown improvement of the lungs. In none of these children have the roentgenograms shown any extension of the disease into uninvolved areas of lung during streptomycin therapy, in spite of the fact that lesions were extending prior to the institution of therapy. Instead, in all these children regression of the disease has been seen during the course of treatment and has continued after treatment has been stopped.

It is well known that tuberculosis in children tends to recovery if the child is removed from its pernicious environment of exposure and if good living conditions are instituted. However, it could hardly be expected that such an improvement in the condition would occur in only a month of hospitalization. Many months of waiting for the healing to progress may thus be compressed into a much shorter period, and the danger of the occurrence of a generalized miliary form or a meningitis may be avoided.

Streptomycin: Its Clinical Uses and Limitations

By D. R. NICHOLS

and

W. E. HERRELL

(Abstracted from the *Journal of the American Medical Association*, Vol. 132, 28th September, 1946, p. 200)

THE antibiotic agent streptomycin appears to have a place in the treatment of certain important bacterial infections. With few exceptions the degree of sensitivity of organisms to streptomycin as determined by *in vitro* studies can be used as an index of the probable effectiveness of the treatment with streptomycin.

Satisfactory concentrations of streptomycin can be obtained in the blood and urine following intravenous, intramuscular and subcutaneous administration. The antibiotic is not destroyed in the gastrointestinal tract, and a large percentage of it can be recovered from the faeces when it is given by mouth. After oral administration, however, streptomycin cannot be detected in significant amounts in the blood and urine of patients. Streptomycin may be administered locally. It also may be administered by means of intrathecal injection and it may be instilled into various body cavities. Streptomycin diffuses fairly readily throughout the body. It is excreted readily in the urine without evidence of a toxic effect on the kidney. The usual daily dose of streptomycin employed in the treatment of infections is 2,000,000 to 3,000,000 units (2 to 3 gm.).

From the analysis of the results obtained in the treatment of 104 patients who received streptomycin under our own supervision and from the analysis of the results obtained in an additional group of 88 cases, certain conclusions can be made.

Streptomycin appears to be of considerable value in the treatment of bacteremia due to gram-negative organisms sensitive to its action.

Streptomycin is of definite but limited value in the treatment of infections of the urinary tract. Best

results are obtained when the organism of infection is *Proteus vulgaris* or *Aerobacter aerogenes*. Good results may be obtained at times when the organism of infection is *Escherichia coli* or *Pseudomonas aeruginosa*. Intensive treatment for a short duration appears to yield the best results.

Meningitis due to *Hæmophilus influenzae* usually responds satisfactorily to streptomycin. Additional treatment in the form of sulphonamides and anti-serum may be indicated for this infection. Streptomycin appears to be of greatest value in the treatment of tularæmia. It appears to be of definite value in the preparation of patients for pulmonary resection. Temporary or permanent eradication of sensitive organisms from the tracheobronchial tree at times can be achieved by its use. Temporary symptomatic improvement may occur from the use of streptomycin in the treatment of ozena. At this time final statements cannot be made concerning the value of streptomycin in the treatment of pulmonary and extrapulmonary tuberculosis.

Included among the infections in which streptomycin has proved of doubtful value are typhoid and paratyphoid fever, undulant fever, osteomyelitis, peritonitis and cholangitis.

Organisms at times develop resistance to streptomycin with incredible rapidity. This has a tremendously important bearing on the clinical results obtainable following its use.

No serious uncontrollable toxic reactions have been encountered from use of streptomycin in the cases herein reported. On the other hand, irreversible neurotoxic effects on the eighth cranial nerve may occur if treatment with streptomycin is prolonged.

Psychic Factors in the Development and Treatment of Obesity

By S. C. FREED

(From the *Journal of the American Medical Association*, Vol. 133, 8th February, 1947, p. 369)

STATISTICAL studies of obese persons show that overweight is responsible for the earlier development of degenerative diseases which result in increased death rate. There is little evidence that obesity is a glandular or metabolic disturbance. The psychological factors in obesity are paramount since the tendency to overeating is a strong drive for oral gratification. Any condition which increases the nervous or psychic tension of the person will cause an aggravation of this tendency. These tensions may result from environmental conditions, economic factors, monotony of food habits, organic diseases and various other causes of nervousness. In only rare cases obesity is of endocrine origin. Climacteric and premenstrual tensions are responsible for overeating due to increased nervous tensions. Similarly, puberty and pregnancy are conditions which commonly precipitate overeating through the development of anxieties and fears. To treat these cases, the psychological factor should be studied. If the nervous irritability is of a temporary nature barbiturates will be helpful. Whereas if the emotional tension is a deeper one an effort should be made to determine the cause for overeating from a psychological point of view. Amphetamine sulphate (Benzedrine sulphate) in 5 mg. doses three times daily before each food will reduce the level of satiability to a more normal one. The use of thyroid in stimulating the combustion of fat may be effective but after the dose approaches toxic levels. The administration of thyroid to an obese person will result in one of three responses:—

(1) He may lose weight (but if the food is not controlled he rapidly regains the weight).

(2) No effect is encountered although the patient may take huge amounts of the drug.

(3) There may be an increase in weight due to the development of a stronger appetite through the toxic effects of thyroid productive of nervousness and

irritability. In old persons where the cardiac reserve is small there is possibility of harms in many persons.

The ideal treatment of obesity involves education of the parents to the use of proper eating habits for their children and other psychologic training which induces a satisfactory adjustment to life through emotional maturity.

M. M. A.

Prolonged Reaction to Benadryl

By S. SCHWARTZBERG

and

D. WELLERSON

(From the *Journal of the American Medical Association*, Vol. 133, 8th February, 1947, p. 393)

REPORTED side reactions of benadryl are: drowsiness, sleepiness, nervousness, dryness of the upper respiratory passage, weakness, fatigue, ataxia, facial oedema, urinary frequency, nausea, epigastric distress, bad taste, a tendency to bleed, a sense of relaxation, tingling of the extremities or body tinnitus, chilliness, pruritis, a taste like chloroform, faintness, acute hysterical reaction, dilated pupil, stupor narcolepsy, confusion, blurred vision, sore tongue, pallor, hot flushes, aggravation of allergic state, irritability, palpitation, exhaustions, collapse, somnambulism, dizziness, numbness, cold extremities and muscular aching. To these may be added headache and acute melancholia. All these reactions disappear with the discontinuance of the drug. Allergic reactions producing asthma and other vasospastic conditions have also been reported.

Unusual and prolonged toxic manifestations in a patient after a dose of 150 mg. of benadryl are reported. Along with the usual side reactions of drowsiness, lethargy, numbness, tingling of the extremities, the patient showed symptoms of neuritis. This toxic reaction is considered to be due to the displacement of histamine in the tissues.

M. M. A.

Unusual Side Effect of Benadryl

By H. R. WEIL

(From the *Journal of the American Medical Association*, Vol. 133, 8th February, 1947, p. 393)

SYMPTOMS of nervousness, difficulty in co-ordination and muscular twitchings were experienced by a child of 3½ years on administration of benadryl, for the treatment of hay fever, rhinorrhœa, conjunctivitis and sneezing. With a dose of 150 mg. of benadryl the child showed signs of muscular twitchings of the face and involuntary spastic movements of the extremities followed by urinary incontinence. In about ten minutes he became irrational in his conversation and his speech gradually became slurred. One and a half grain of seconal produced sleep only for a short while and failed to stop the muscular twitchings. After a second nap of two hours the twitchings disappeared and the child became normal.

The child could tolerate later on 50 mg. of benadryl without any bad effect. It is suggested that the dose of benadryl should be restricted up to 2 mg. per kg. of body-weight.

M. M. A.

Unusual Reactions of Benadryl

By J. GRIEGER

S. Z. ROSENFELD

and

D. L. HARTMAN

(From the *Journal of the American Medical Association*, Vol. 133, 8th February, 1947, p. 392)

MILD toxic reactions, drowsiness, dizziness, weakness and nausea are often encountered after the administration of benadryl (B-dimethyl amino-ethyl benzhydryl

ether hydrochloride), a new drug having antiallergic and antispasmodic properties. In sixty-three per cent of patients the drug showed toxic manifestations of which drowsiness of varying degree up to narcolepsy was often noticed.

One female patient, aged 26, suffering from seborrhoeic dermatitis of unknown origin, on administration of benadryl 50 mg. three times a day to combat pruritis, complained of palpitation of heart, dimmed vision, malaise, heart burn and nausea. After a total dose of 350 mg. the patient was found unconscious in bed, cold, pale and pulseless. The drug was stopped and an injection of adrenaline chloride (1-1,000) 0.45 c.c. was given. Within half an hour the pulse was improved, and the patient was normal in three hours, with no recollection of what had happened. On re-administration of 300 mg. of benadryl again the patient suffered from similar reactions but recovered when the drug was discontinued. This shows that the drug at times produces shock-like reactions.

M. M. A.

Danger of Self-medication and Large Dosage with Benadryl

By McBORMAN

(From the *Journal of the American Medical Association*, Vol. 133, 8th February, 1947, p. 394)

A CONVENT nun, aged 18, took 2 capsules of benadryl 50 mg. each on the first day with decided relief. Encouraged by this improvement she took subsequently 40 capsules in three days. As a result she became drowsy, lethargic, confused and disoriented. Within 48 hours she however made an apparently complete recovery.

It is of interest to note that the well-being of the medicament affected the judgment of the patient as a result she increased the dosage without obtaining further advice.

M. M. A.

Benadryl, A Contributing Cause of an Accident

By B. J. SLATER

and

N. FRANCIS

(Abstracted from the *Journal of the American Medical Association*, Vol. 132, 28th September, 1946, p. 212)

WHILE it is recognized that benadryl is a very effective agent in the treatment of urticaria and in the control of pruritis in allergic dermatosis, it exhibits a common side reaction, drowsiness, in more than half of the patients taking it. This drowsiness is usually mild, but some patients report that they slept as long as eighteen hours after taking only 50 mg. of benadryl. When the dose is reduced to 10 or 20 mg., it is better tolerated and the side reactions, if they occur, are diminished. Leving, using 50 to 100 mg. of benadryl every four to six hours in his series of 400 cases, enumerated twenty-four different side reactions, with drowsiness occurring in 60 per cent of his cases.

In our series of 65 cases, drowsiness has been a common symptom twenty-five times. This figure should be increased somewhat, as many of our patients were instructed to take the drug only at bed time. Invariably they reported that they slept better than usual. Drowsiness may occur from one to three hours after taking benadryl, and this drowsiness may be cumulative if the drug is continued.

Because of this narcotic side reaction incident to the taking of benadryl, the drug may be a serious hazard when used by persons operating automobiles or in industry operating moving equipment or machinery.

Isopropyl Alcohol for Sterilization of Metal Instruments

(Abstracted from the *Journal of the American Medical Association*, Vol. 133, 8th March, 1947, p. 734)

ISOPROPYL alcohol is a somewhat stronger germicide against vegetative forms than is ethyl alcohol. In addition it has advantages of lower surface tension and greater fat solvent action. The maximum bactericidal concentration of isopropyl alcohol is full strength, as compared with a maximum bactericidal concentration of 70 per cent by weight for ethyl alcohol. The best grades of commercial isopropyl alcohol are said to be 98 to 99 per cent. The small water content of these solutions renders them less corrosive for metal instruments than the 70 per cent ethyl alcohol solution.

Unfortunately, however, neither ethyl nor isopropyl alcohol can be depended on to kill spores. Scalpels are frequently contaminated with sporulating pathogenic micro-organisms. That is probably true also of needles, scissors and other instruments which come into contact with skin. Immersion in isopropyl alcohol for several hours or even several days is not a trustworthy method of sterilizing such instruments.

Isopropyl alcohol is sold at present in unadulterated form, which is not irritating to the operator's hands or patient's skin.

Tuberculosis Statistics in the United States

(Abstracted from the *Journal of the American Medical Association*, Vol. 133, 8th March, 1947, p. 698)

SINCE the turn of the century the death rate from tuberculosis in the United States has been reduced, according to the Metropolitan Life Insurance Company's Statistical Bulletin of November 1946 (Wiping Out Tuberculosis in Our Time), from approximately 200 per hundred thousand to about 40. In the white population the disease is now a relatively minor cause of death, with a rate of 30 per hundred thousand. In 1944 forty-three states had tuberculosis death rates under 50 per hundred thousand, whereas in 1934 there were only twenty states in that category. In five states the death rate from the disease in 1944 had dropped to well below 20 per hundred thousand. The campaign against tuberculosis has been intensified greatly through the availability of increased funds and through the impetus given by the organization of the Tuberculosis Division of the U.S. Public Health Service. The Bulletin quoted expresses the opinion that tuberculosis may cease to exist in our time. Among the favourable factors may be mentioned the fact that the chances of becoming infected are now greatly diminished and that people generally live and work under more healthful conditions are better fed and have more adequate knowledge of personal hygiene. The facilities for detecting existing cases have made great advances, so that a greater proportion of unsuspected infections are being discovered in the early stages, when the chances of cure are best. The use of mass x-ray examinations in the army, in schools, in colleges, in factories and in entire communities has undoubtedly contributed much to early recognition of the disease. Tuberculosis still ranks high among the causes of death at most age periods. Among white women from 20 to 34 years of age it remains the principal cause of death, accounting for about one-fifth of all deaths in this broad age range. Among white men the disease ranks second only to accidents in the prime ages from 20 to 39 years. In these two decades of life among Negro men, according to the Bulletin, tuberculosis outranked every other cause without exception, as it did among Negro women of the age range from 10 to 39 years. The conquest of tuberculosis, if at all possible, involves not only full utilization of the existing knowledge and facilities for discovering and treating the disease but also the creation of healthful environmental conditions of work and recreation. The attack may well be concentrated in those areas and among those persons in the population where infection is most prevalent and death rates highest.

Reviews

A HANDBOOK OF CLINICAL MEDICINE: VOLUME I:—DISEASES OF THE HEART AND KIDNEY.—By J. C. Banerjee and P. K. Chatterjee. 1947. U. N. Dhar and Sons Limited, Calcutta. Pp. 184. Price, Rs. 8

THIS is the first of a series of small handy volumes intended to present clinical medicine in a manner which the authors have found useful for bedside training. The plan evidently is to first detail the various clinical methods of examination under each system and then proceed with descriptions of diseases of that system. The book opens with an introductory chapter which includes a general scheme of case taking for routine use. Then considerable space has been devoted to the investigation of diseases of the heart and kidneys which are the subject-matter of this volume. These diseases have been treated with reference to their aetiology, symptomatology, diagnosis and treatment in a concise form with an up-to-date information of them and their management. Finally, in two appendices are given the essentials of clinical electrocardiography and the methods of urine analysis. We have no doubt that the volume will prove useful to students at the bedside as well as in their examinations. An indication should have been given of the number of volumes that will complete the series.

R. N. C.

MODERN MANAGEMENT IN CLINICAL MEDICINE.—By F. K. Albrecht, M.D. 1946. Baillière, Tindall and Cox, Limited, London. Pp. ix plus 1238. Illustrated. Price, 55s.

THIS is a book mainly on diagnosis and treatment, the subjects under each system being presented in condensed, simplified and readily available form. Recognizing that there are no short-cuts in medicine, the author lays stress on a careful case-history and painstaking physical examination as the foundation stone of diagnosis, and as these are often not enough, he indicates and describes laboratory studies and specialized procedures including new advancements and techniques that are of value. The discussion of treatment is elaborate enough to give a clear picture of the rationale and technique of therapy. The diseases treated cover a wide field and include endocrinology and common skin and tropical disorders, and the last four chapters are on chemotherapy, geriatrics, the care of ambulatory patients which is full of much practical advice, and clinical laboratory medicine. In an appendix are given more routine diets and common procedures which range from lifting and turning patients to a description of the technique of blood transfusion. The book is obviously the product of much painstaking labour and judicious selection of materials and enriched by the author's own observations and experiences in the field of internal medicine. It well deserves its title and should be welcome to general practitioners, house officers and specialists who will find in it recent information about diagnosis, differential diagnosis and treatment quickly and in a succinct form. The book, as the author says, is intended for the doctor's office, not his library.

R. N. C.

THE ACUTE INFECTIOUS FEVERS: AN INTRODUCTION FOR STUDENTS AND PRACTITIONERS.—By Alexander Joe, D.Sc., M.D. (Edin.), F.R.C.P. (Edin.), D.P.H., D.T.M. & H. 1947. J. and A. Churchill Limited, London. Pp. vii plus 276 with 64 illustrations. Price, 18s.

IN his preface Dr. Alexander Joe writes, 'There are few aspects of the diseases dealt with in which the

author has not had a good deal of personal experience and he has firmly resisted the temptation to write on subjects not covered by this'. And as he also writes in easy and fluent style, the result has been a book which is full of much practical information and pleasant to read. The diseases which he has described are nearly all more or less common: they are scarlet fever, erysipelas, puerperal sepsis, diphtheria, whooping cough, cerebro-spinal fever, enteric fever, measles, chickenpox, smallpox, mumps, rubella and erythema infectiosum. In addition there are two chapters on vaccination and serum reactions. Each disease has been described with reference to its pathology, transmission, infectivity, clinical features, diagnosis, prognosis, prophylaxis and treatment. The work will be found useful to students and practitioners who wish to brush up their knowledge of these common conditions.

R. N. C.

DIABETES.—By Lieut.-Colonel Henry J. John, M.A., M.D., F.A.C.P., M.C. 1946. The C. V. Mosby Company, St. Louis, U.S.A. Pp. 300. Illustrated

THE successful treatment of diabetes depends to a large extent on a close co-operation between the physician and his patient. To achieve this object an intelligent understanding of the underlying principles of the disease in all its various aspects is essential and we are of opinion that Colonel John's book is an useful addition to such series designedly written with that object in view.

In the present volume, the author has tried to present the problems regarding the management and treatment of diabetes to the general practitioners in a simple way. The clear and lucid style in which it is written will no doubt be appreciated by them. He has also given several simple but valuable tips regarding the effective management of diabetic patients which would be helpful to a busy practitioner.

The author has very rightly warned the practitioners about the fallacy of depending upon glycosuria as the sole criterion of sugar metabolism, though, we must admit, that we cannot share with him the same anxiety regarding the pathological consequences which are likely to follow repeated or sustained hyperglycaemia. While we are in complete agreement with him that prolonged hyperglycaemia will certainly have damaging effect on the pancreas, yet we consider statements such as 'Every day we let a patient carry hyperglycaemia he has that much less pancreas left' to be rather extreme.

J. P. B.

DEVELOPMENTAL ANATOMY: A TEXTBOOK AND LABORATORY MANUAL OF EMBRYOLOGY.—By Leslie Brainard Arey, Ph.D., Sc.D., LL.D. Fifth Edition. 1946. W. B. Saunders Company, Philadelphia and London. Pp. ix plus 616. Illustrated. Price, 35s.

IT is not usual to find practical lessons in a textbook as given in this book. They have been incorporated in the last section, are very well chosen and so illustrated as to ensure a thorough understanding of the different stages of the developmental processes.

The subject-matter of the text is grouped in two sections: one dealing with general features of embryology and the other devoted to the development of various organs and systems of the body. The practical portion forms the third part of the book and is designed for laboratory works. Although the plan and sections of the book have not altered, there has been a very large amount of rewriting and refashioning of the chapters in each section. Recent researches have necessitated a drastic revision, and by the inclusion of such new matters, the text has been brought abreast of the modern conception of the subjects. Most of the improvements are noticed in the general section.



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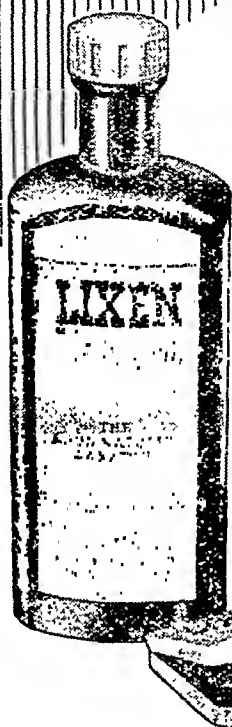
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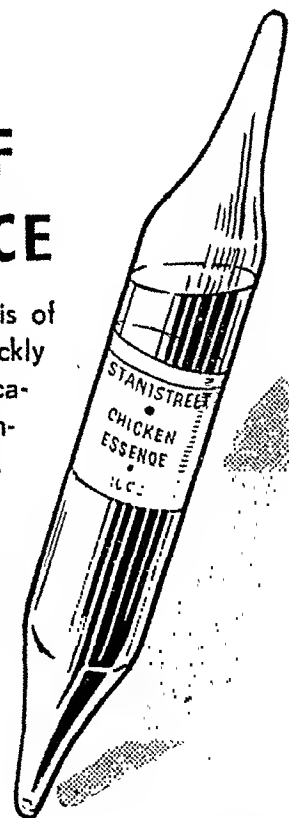
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We can confidently commend the book as thoroughly dependable to all students of embryology as well as to the teachers on whom fall the onerous task of guiding the students in their practical works.

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S. C. S.

A PRACTICAL HANDBOOK OF PSYCHIATRY FOR STUDENTS AND NURSES.—By Louis Minski, M.D., F.R.C.P., D.P.M. 1946. William Heinemann (Medical Books) Ltd., London. Pp. 128. Price, 6s.

This small volume contains a comprehensive collection of various aspects of psychiatry in brief. The preface states that it is written primarily for students and nurses but it is needless to say that it will prove of equal value to educators and practising members of the medical profession as psychiatry is a social and medical science.

The first chapter deals with the development of the individual which is essential to the studies in the mechanism of the normal working of the mind as well as the psychopathology of everyday life. The book gives a critical evaluation of the practical methods and therapeutic results of insulin shock therapy in schizophrenia, malaria shock therapy in general paralysis and convulsion therapy in involutional depressive states. The value of the book would be greatly enhanced if in future editions the author considers in more detail the fundamentals of psychoanalysis for psychotherapy and includes a short bibliography. The book will be a great stimulus to those interested in psychiatry.

J. N. B.

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES NO. 256. 'THE CULTIVATION OF VIRUSES AND RICKETTSIAE IN THE CHICK EMBRYO.'—By W. I. B. Beveridge and F. M. Burnet. 1946. Published by His Majesty's Stationery Office, London. Pp. 92. Illustrated. Price, 2s.

This report is the revised version of a previous Medical Research Council Monograph (No. 220) by one of its authors in which the method of growing viruses in the chorioallantoic membranes of fertile hens' eggs had been described. This technique was first used by Rous and Marphy in 1911, but as a result of pioneer studies of Goodpasture in America and Burnet in Australia, the developing egg can now be used in a number of different ways: the virus can be inoculated into the amniotic or allantoic cavities, into the yolk sac, into the veins of the membranes or even into the brain or other parts of the embryo itself. Each of these routes has its usefulness for special purposes. It has now been established that fertile hens' eggs, in spite of certain limitations, offer many advantages over other methods for the study of virus. In addition they have been found to give much greater yields of some viruses or rickettsiae than obtainable otherwise, and they are thus a very good source of material for vaccines. This has been exploited for manufacturing vaccines for typhus and yellow fever and influenza. Another use of them is a source of diagnostic reagents such as Frei's antigen for the diagnosis of lymphogranuloma venereum or the reagents needed for performing hæmagglutination test. Virus workers in these fields of study will find the present report a rich source of information. The work on which this report

is based was carried out by the authors in the Walter and Eliza Hall Institute in Melbourne.

R. N. C.

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES NO. 258. 'THE PRESERVATION OF PROTEINS BY DRYING. WITH SPECIAL REFERENCE TO THE PRODUCTION OF DRIED HUMAN SERUM AND PLASMA FOR TRANSFUSION.'—By R. I. N. Greaves. 1946. Published by His Majesty's Stationery Office, London. Pp. 64 with 20 plates. Price, 2s.

When the war broke out in 1939, it seemed certain that blood transfusion would play an important part in the treatment of casualties but difficulties were anticipated in the preservation and transport of citrated whole blood in liquid form for use in the field. Indeed, soon there was an urgent demand for satisfactory blood derivative which would be stable, readily transportable and suitable for administration to any patient. Luckily it was known at the time that therapeutic sera could be preserved by drying without injury to their protein structure and properties, and it seemed that drying, by appropriate methods, could be applied also to the preservation of human plasma or serum. This was actually done, and experimental batches of the dried material reconstituted with water, was given by transfusion to patients and shown to be safe. A blood drying unit was then established by the Medical Research Council at Cambridge under the direction of Dr. Greaves. The work of this unit which passed through severe phases is described in this report.

The new and bigger plant which was erected with a gift of £20,000 from the Wellcome Trustees produced in 1943-45 close on half a million bottles of dried plasma and serum. The method of drying by sublimation after 'high speed vertical spin-freezing' followed by secondary desiccation resulted in a very satisfactory product which was easily reconstituted and very stable even in extremes of temperature. There will be need for those life-saving products in peace-time transfusion practice, and moreover, the experience gained by the unit during the war, will be applicable in the future to the preservation of many biological products. The report is invaluable to all blood banks.

R. N. C.

MEDICAL RESEARCH COUNCIL. SPECIAL REPORT SERIES NO. 259. 'THE MURINE TYPE OF TUBERCLE BACILLUS (THE VOLE ACID-FAST BACILLUS).'—By A. Q. Wells. With notes on the morphology of infection by the vole acid-fast bacillus. By A. H. T. Robb-Smith. 1946. Published by His Majesty's Stationery Office, London. Pp. 48. Illustrated. Price, 2s.

In 1937 Dr. A. Q. Wells discovered an acid-fast bacillus giving rise to a disease in voles which he described as tuberculosis. Though it was regarded by some as a form of leprosy, further investigations showed that his description of the disease was essentially correct. The first part of the present report written by Dr. Wells himself, deals with the morphology, culture and pathogenicity of the vole bacillus and results of immunization experiments with it. The bacillus can be grown in artificial culture and is capable of producing characteristic tuberculous reactions when injected into animals; it is antigenically indistinguishable from the human and bovine types of tubercle bacillus, and it forms a tuberculin in liquid media which is very closely allied to, if not identical with, mammalian 'old tuberculin'. It is therefore fair to conclude that the organism is a third type of mammalian tubercle bacillus, and the term 'murine type of tubercle bacillus' seems to be appropriate. But of greater interest is the fact that animals injected with vole bacillus rapidly become sensitive to tuberculin, suggesting that it might confer some degree of protection against tuberculosis. Preliminary experiment carried on guinea-pigs have shown the truth of this

surmise. In the second part of the report Dr. A. H. T. Robb-Smith gives a descriptive account of the lesions in the tissues of naturally and experimentally infected animals. The report will interest tuberculosis workers. The possibility of making a field trial of the vaccinating effect of vole bacillus against tuberculosis is being considered.

R. N. C.

BOOKS RECEIVED

Mayavati Charitable Hospital, Mayavati, Almora, Himalayas. Report for 1946. Issued by Swami Pavitrnananda, President, Advaita Ashrama, Mayavati.

Nutrition. Bulletin No. 29. May 1947. Published by the Department of Food, Government of India, New Delhi. Pp. 32. Illustrated.

Abstracts from Reports

REPORT ON THE LONDON SCHOOL OF HYGIENE AND TROPICAL MEDICINE FOR 1945-46

THIS first post-war report indicates how in spite of bomb damage to the building, reduced staff and dispersal of equipments steps were taken, immediately after cessation of hostilities, to resume teaching activities of the School. Regular courses in diploma for public health, tropical medicine and hygiene, and bacteriology were begun, but such was the demand that a duplicate course in public health had to be organized. The short intensive courses in various subjects which were adapted to the needs of service medical officers and which were attended by 2,259 men and women during the war have been discontinued being no longer necessary. New enterprises are being promoted. A new department on human nutrition has been created under Professor B. S. Platt and through the generosity of the Wellcome Trust a chair of tropical medicine has been established, Brigadier Hamilton Fairley being its first occupant. A new sub-department of mycology has begun its work. The expanding field of tropical hygiene is recognized in the appointment of Dr. G. McDonald to an academic chair. The full development of occupational hygiene is under active consideration. The small new hospital for tropical diseases at Devonshire Street being unsuitable for teaching purposes, arrangements have been made to hold clinical sessions in Albert Dock, Dreadnought and Queen Mary's (Ministry of Pensions) hospitals and the Royal Army Medical College. Three senior members of the staff have retired—Professor R. T. Leiper (Parasitology), Brigadier G. S. Parkinson (Public Health) and Major P. G. Edge (Epidemiology and Statistics).

The report gives briefly some account of the work done in various departments but owing to the reasons given above it has not been possible to undertake any organized research work. Indeed the staff in some departments had to be supplemented by outside workers with expert knowledge and experience for teaching purpose. It is worth mentioning that Professor Raistrick (Biochemistry Department), as Scientific Adviser to the Ministry of Supply, contributed to the manufacture of penicillin on a commercial scale. He also visited America in connection with the production of streptomycin for clinical trials to be carried out under the Medical Research Council. The investigation into the treatment of 'carrier' cases of amœbic infection with diodoquin has been continued with encouraging results. An attempt has been made to introduce the results of many outstanding advances in entomological technique which have been made during the war into the teaching of D.P.H. and D.T.M. & H. courses. The department of medical statistics, besides

giving regular courses of instruction, is continually engaged in advising and carrying out statistical analysis of data for workers over a wide field of medical research. Attempts are being made to elucidate the life histories of mammalian and avian malarial parasites in the pre-erythrocytic stage, i.e. during the incubation period.

The Ross Institute of Tropical Hygiene which works in close co-operation with other departments of the School but retaining its individual character has taken part in the instruction of medical students as well as laymen, started some researches and done valuable work through its branches in Asia and Africa. The report also includes an account of the work of the Institute of Agricultural Parasitology at Wines Farm.

R. N. C.

ANNUAL PUBLIC HEALTH REPORT OF THE PROVINCE OF ASSAM FOR THE YEAR 1944. BY MAJOR T. D. AHMAD, B.A., M.B., Ch.B., D.P.H., D.T.M. & H., I.M.S., DIRECTOR OF PUBLIC HEALTH, ASSAM

THE birth-rate (16.77 per mille) during the year showed a further fall from that (19.06) in the previous year; and the death-rate (16.74 per mille) showed an increase over the previous year's rate (16.34). The districts of Cachar and Sylhet recorded death-rates above the quinquennial average of 16.99, while the remaining districts were below it. The highest death-rate (46.12) in rural areas was in the Baniyachang Circle in the Sylhet district, due to the continuance of the malaria epidemic which first broke out in 1942. The rate of child mortality, after showing a decline for several years, showed a sharp increase during the year; and the rise is perhaps due to the cumulative effects of disturbed conditions arising out of the war, and to the scarcity of protective foods. But the general high rates of child mortality prevailing during the past years, point to the need for a properly organized system of pre-natal care, and maternity and child welfare work, which are at present hampered for lack of funds.

Of the diseases causing death during the year, the chief are fevers, dysentery and diarrhoea, cholera and smallpox.

Fevers.—Deaths from 'fever' are mainly due to malaria and other diseases having fever as the predominant symptom. As already mentioned a large toll of life was taken by the malaria epidemic at Baniyachang. Quinine and other anti-malaria drugs continued to be supplied to the indigent malaria patients in the badly affected areas of the province. The Assam Medical Research Society, which directed its work mainly to malaria, continued its useful work. The activities of the Society suffered on account of its lending the Malaria Research Officer to the Public Health Department of the Provincial Government for employment as Malariologist in connection with the malaria epidemic at Baniyachang.

Kala-azar.—Kala-azar, which showed signs of recrudescence since 1937 and reached the peak in 1940, appeared to be on the decline during the year, though this could not be confirmed by survey works which could not be effectively maintained on account of the paucity of qualified doctors as a result of the deputation of a large number of them to military duty, and to the non-availability of suitable substitutes in their places.

Cholera.—The incidence of cholera during the year was low, the number of deaths from it being 4,107 against 15,454 of the previous year. The epidemic which broke out in 1943 continued till the early part of 1944, during which the incidence of the disease was comparatively higher.

Smallpox.—During the year smallpox was prevalent in epidemic form throughout the province; the district of Sylhet, where the disease seems to be endemic, being the worst sufferer. The number of deaths from smallpox during the year was 11,728 against 1,692 in the previous year.

Dysentery and diarrhoea.—The number of deaths from these increased slightly during the year. A total of 11,100 persons died from these diseases against 10,577 in the previous year.

Leprosy.—A total of 786 leprosy cases was treated in the Public Health Department dispensaries. As a result of the survey undertaken by the Special Leprosy Officer in an area of the Goalpara district 157 cases of leprosy was detected and a Public Health Department dispensary with an out-centre was opened for the treatment of the detected cases. As before the Missionaries and the British Empire Leprosy Association did excellent anti-leprosy work which Government again take the opportunity to appreciate. The Post-War Anti-Leprosy Scheme is under the consideration of Government.

Tuberculosis.—The Provincial Tuberculosis Association maintained steady progress in its activities. Accommodation at the Lady Reid Chest Hospital at Shillong was raised from 28 to 47. A second clinic named the Bijoyendra Clinic was also opened at Dibrugarh and it did good work.

Maternity and child welfare.—The good work done by the Red Cross Society in this sphere was continued during the year. There is still no recognized institution for the training of midwives within the province. The training centres at Sylhet and Silchar provide courses of *dhais*.

Food adulteration.—Due to the war the supply of articles of foodstuffs was generally short and adulteration was high. The administration of the Assam Pure Food Act, 1932, which lies with the local bodies still remained far from satisfactory.

Sale of quinine.—The sale of quinine and its substitutes remained under Government control under the supervision of the Director of Public Health. Considering all circumstances the province got a fair supply of quinine and other anti-malaria drugs.

Public health administration.—The year 1944 saw the fulfilment of the long-standing need of the department for its re-organization. As a consequence of the re-organization, which affected the eight plains districts of the province, the control of public health activities passed from the hands of the Civil Surgeons to the District Medical Officers of Health, who were made directly responsible to the Assistant Directors of Public Health. To cope with the increase of work that would follow the re-organization of the department a third permanent post of Assistant Director of Public Health with headquarters at Jorhat was created.

TRANSACTIONS OF THE THIRD TUBERCULOSIS WORKERS' CONFERENCE HELD IN NEW DELHI IN MARCH 1945

THIS was the first conference since 1940 and was attended by 65 delegates representing provinces and states. It lasted three days during which various administrative and clinical subjects were discussed.

In the opening speech Lieut.-General Hance, I.M.S., drew attention to the extremely inadequate provision in personnel and institutional facilities compared with the needs of the country where the annual death rate from tuberculosis is half a million and there are at least 2½ millions of active cases. He pointed out that even if all the money necessary to build all the institutions were immediately available, they could not be established because the necessary personnel to staff them is not available. He expressed the hope that soon every university will establish a T.D.D. course and that future institutions will be localized not on the tops of hills but where most needed, viz, near the houses of patients. Dr. P. V. Benjamin said that our aim should be one clinic for each 50,000 urban population and one clinic for each 100,000 rural population, some of the latter being mobile, and at least one hospital or sanatorium bed for each annual tuberculosis death; then there must be after-care agency to follow up the treated cases after their discharge. As it will take many years to achieve an object of such magnitude

he suggested that we should set about with short-term policy to fit in with the long-term programme of which an outline was given. Dr. B. Jayaram Naidu described a plan for 10-year anti-tuberculosis work in Mysore State. Dr. J. Ahmed spoke on the rising tide in tuberculosis, Dr. Riaz Ali Shah on tuberculosis during war time, and Dr. T. J. Joseph on the tuberculous soldier. In the discussion that followed, opinions were expressed that the Government should take charge of all schemes including financial provisions and that the Tuberculosis Association should lead the education campaign including education of the medical profession and publication of the scientific journals. It was also stated that at present we need more beds in hospitals and sanatoria, for without these surveys, clinics cannot be expected to serve any useful purpose.

Speaking on mass radiography Major Aspin, R.A.M.C., said that suitably practised within a well-established tuberculosis scheme, it will prove the sharpest single weapon we possess in the fight against tuberculosis but its extension to the population as a whole, in advance of adequate provision for institutional observation, treatment and after-care, would be a grave mistake. Incidentally he made a brief reference to the findings at India's first military mass radiography centre in which 3.4 per cent of pulmonary tuberculosis was discovered in 3,511 Labour Unit men and one per cent in 3,097 young Gurkha recruits. These had previously been medically examined. In reviewing tropical eosinophilia Dr. J. Frimodt-Møller gave the result of an analysis of 3,334 patients who had come to Arogyavaram Sanatorium for consultation during the years 1939 to 1944. Among them 131 or 3.93 per cent had symptoms characteristic of the syndrome with eosinophil count of 20 per cent or more. The majority (81 per cent) had a count of 50 per cent more and 7 patients above 80 per cent. Thirty-four per cent had typical x-ray findings. There was no material difference in the degree of eosinophils between patients with normal x-ray and those with typical x-ray findings, and most probably they were all suffering from the same disease. Most cases were negative to tuberculin. Analysis of the monthly figures shows that it was more common in the hot than in the cool months. Further investigation pointed towards a higher incidence in the Eastern coastal area than in the districts further inland, which seems to support Weingarten's observation that environmental factors might be of importance in its aetiology. Dr. Frimodt-Møller is inclined to think that the syndrome depends on an allergic condition in hypersensitive individuals who react to certain airborne antigens arising from grasses or other plants. This theory, he suggests, could be tried out by skin-testing eosinophilic cases and suitable controls with series of allergens prepared from the local flora. The last two papers read on the first day of the conference were on relationship of bronchial asthma and tuberculosis by Dr. P. K. Ghosh and some of the conditions that simulate pulmonary tuberculosis by Dr. R. A. Bidari.

On the second day Dr. Benjamin first spoke on the minimum standards for tuberculosis institutions. As technical adviser to the Association he had visited many clinics, hospitals and sanatoria and was struck with different standards of work; some had reached high standard of efficiency while others were inadequate. It is possible, he said, to have well-equipped wards and yet the standard of the institution may be low. On the other hand fine work has been done with patients in wards which may seem to some to be but primitive. In the subsequent discussion it was pointed out that the staff is often inadequate, that the doctor in charge of a clinic should be a whole-time man and there should be better co-ordination between hospital and sanatoria and clinics. It was also emphasized that it is vital to raise the standards of the health visitors. Dr. B. K. Sikand gave an account of his experiences of organized home treatment, a scheme introduced by the late Dr. C. Frimodt-Møller to meet the special conditions prevalent in India. The treatment was carried out for the

New Delhi Tuberculosis Clinic in two municipal wards of the city with a population between 60 and 70 thousand, all very poor people. Up to December 1944, 603 pulmonary cases came from the area, the majority being in advanced stage of the disease. Co-operation of patients depended on their education and socio-economic conditions. Seventy-five per cent of the patients left treatment within 6 months and only 16 per cent continued treatment from one to four years. The results of treatment as given in tables seem to show its usefulness, though limited, or, as Dr. Sikand puts it, the scheme succeeds only to a point. As regards preventive measures, the appalling home conditions made isolation practically impossible and it was not easy to convince the patient and his family about the infective nature of the disease. Of the contacts 13 per cent were suffering from tuberculosis of some organ or other. Dr. Sikand's conclusion is that the scheme, though good, cannot yield lasting results unless it is accompanied by improvement in housing conditions and backed by funds for social relief measures. There must also be some beds in the clinics for admission of poor patients. Drs. A. C. Ukil and P. K. Sen suggested in a paper quantitative approach to the classification of pulmonary tuberculosis (adult type) based on x-ray appearances, toxic manifestations and presence of complications. Talking on the minimum laboratory standards in tuberculosis work, Mr. R. M. Barton discussed the significance of negative sputum. The significance of the finding of occasional tubercle bacilli by sensitive methods, he said, has not yet been fully worked out. The ideal thing, he said, is to aim at a high standard of examination which must include, when the direct smear is negative, cultures of the sputum and gastric contents, or even animal inoculation. Such minimum standard is seldom attainable. With our present knowledge it is perhaps best to adhere to the standard suggested by the Association, viz, ordinary smear examination on four separate days in each of 3 months and if negative, culture methods before the sputum is declared negative. When the sputum is negative though the patient still shows clinical or x-ray evidence of disease, then if no higher standard than smears can be obtained, the discharge report must state this. Regarding the standard for the number of bacilli in a smear, Dr. Barton would prefer a suitable grouping such as 'numerous' when there are more than 10 bacilli per field, 'few' when 1 to 9 bacilli per field, and 'rare' when only a single bacillus in an occasional field. Speaking of blood examinations, he said that in making differential counts it is of the utmost importance to use one of the methods which take note of the division of the lobes of the neutrophils, viz, the Schilling count, the Arneeth count or the von Bonsdorff count. As regards estimation of the sedimentation rate, most workers are coming to the conclusion that the fine variations are not of importance, but only gross variations and a continued high or low rate is of value. In the afternoon Major S. M. K. Mallick read a paper on immunotherapy. Dr. J. Frimodt-Møller on motility of the colon after barium meal, Dr. S. K. Sen on early diagnosis and treatment of intestinal tuberculosis (said to be comparatively common in Rajputana) and Dr. B. J. Naidu on laryngeal tuberculosis.

On the third day Dr. K. Vasudeva Rao spoke on teaching of tuberculosis in medical colleges and schools. To tackle the disease, he said, it is essential to get the co-operation of general practitioners, but the position is very unsatisfactory as tuberculosis now forms an insignificant part of medical teaching. In Madras a change for the better has come in recent years; each final year student is required to attend 12 lectures, 12 clinical demonstrations and 12 bedside clinical periods in a tuberculosis hospital. But he said that is not enough and suggested (1) creation of a tuberculosis department under a separate professor, (2) three months' teaching in a tuberculosis hospital plus at least 15 lectures and (3) post-graduate courses. The remaining papers on this day were on paradoxical respiration occurring in collapse therapy by Dr. Sam

Bose, post-operative complications of thoracoplasty and their treatment by Dr. Amir-ud-din, intrapleural pneumolysis by Dr. Riaz-i-Quader, and the rôle of cardiovascular apparatus in pulmonary tuberculosis by Dr. S. N. Ahmed.

In conclusion we would suggest that a short summary be added to each paper that appears in future publications of the conference proceedings.

R. N. C.

Correspondence

DISSOLUTION OF THE I.M.S.

THE following advance copy of a letter of retrospect and farewell, which Lieutenant-General R. Hay, C.I.E., K.H.R., I.M.S., Director-General, I.M.S., proposed to post to all officers of the I.M.S. on the eve of its dissolution, has been sent to us for publication.

Members of the Indian Medical Service :

Our service dissolves on the 14th of August, 1947, and I send you this letter of retrospect and farewell.

Our history as a service dates back to 1612 when on the formation of the East India Company into a joint-stock business, John Woodall was appointed the first Surgeon-General of the Company. He held this office for nearly thirty years and for many years was the only Surgeon-General of the Company. Until 1763, when the surgeons employed by the East India Company were combined into a regular establishment, with fixed grades for promotion, medical officers were recruited more or less on individual contracts. Though occasionally involved in the desultory fighting which took place from time to time, they were essentially civilians and engaged in purely civil duties. From 1745 onwards, however, the Company's wars in various parts of India necessitated the formation and maintenance of regular bodies of troops and in consequence the employment of military surgeons. In 1766, therefore, little more than two years after its first formal constitution, the Medical Service in India was divided into two branches, military and civil. It was combined into one service soon afterwards, but in 1796 was again split up. The separation was once more found impracticable and the two services were speedily reunited.

The professional activities of our early predecessors in the service were most varied. They were eligible for practically any post in which scientific knowledge was required. They were regularly employed, for example, in the Assay Department and in Botanical Gardens, and not infrequently went further afield. Among those extra-professionally employed, a Commission appointed in 1866, noticed a postmaster, a cotton agent, a superintendent of a school of arts, a naturalist, a political agent, a commissioner and a conservator of forests. Members of the service played an important part in the organization of both the Forest and Veterinary Departments.

A Professor of Chemistry in the Calcutta Medical College, conducted the first experiments for the introduction of the electric telegraph in India and became the first Director-General of Telegraphs in 1852. Later, a Physician-General, Madras, introduced cochineal into India and had a large share in the introduction of silk, sugarcane, coffee and American cotton.

With the increasing specialization of Government Departments and the recruitment by them of their own experts, the call on our service to fill posts outside our strictly professional sphere gradually diminished, the variety of our activities was curtailed, and we concentrated increasingly on our medical work. In 1896 the medical establishments of Bengal, Madras and Bombay were amalgamated into one service under the direct control of the Government of India and the designation 'Surgeon-General to the Government

of India' was altered to that of 'Director-General, Indian Medical Service'.

Until the first great war, the I.M.S. in spite of its basic military nature was, in fact, predominantly civil in character. The Royal Commission on the Public Services (1912-15) found that out of 748 officers 475 were engaged in civil duties. Thereafter, though from time to time the monopoly of superior civil appointments enjoyed by the service was substantially reduced, it retained its dual character, the last reorganization in 1937 fixing the military strength at 364 and the civil at 220. From 1915 the percentage of Indian recruitment steadily increased. In this regard, we can claim that we have contributed at least as much as any other branch of the Defence Services to enable this country to shoulder the responsibilities devolving on it under the new constitution. A feature of the service's history in these latter years was the creation from its ranks on the separation of Burma of a civil medical service for that country.

By 1939, many thoughtful members of the service had arrived at the conclusion that in order to meet the political and administrative requirements of modern India a fundamental reorganization of the service was overdue. A suitable reorganization would, they felt, include the creation by the Defence Services of their own medical corps. In 1943, the creation of the Indian Army Medical Corps made the abolition of the I.M.S. in its present form merely a matter of time. The far-reaching constitutional changes of 1947 have made it immediate.

As I pen these words to you, the service is being wound up and its members are dispersing. Some of us will find new careers in the service of the Crown, in the health services at home, and elsewhere in the British Commonwealth. We know that their service here has fitted them to contribute generously to their new tasks. Our Indian members will be completely absorbed, with some of their British colleagues, in the two new Dominions. To them in their new sphere and to those who will work with them, we hand on our torch. Its flame has burned brightly through nearly three centuries of distinguished and devoted service. It is our cherished hope, nay, rather, our firm conviction, that in their hands its light will not fade.

FRATER, AVE ATQUE VALE!

R. HAY,

LIEUT.-GENERAL, I.M.S.

OFFICE OF THE DIRECTOR-GENERAL,
INDIAN MEDICAL SERVICE,
New Delhi, 14th August, 1947.

STRANGE THOUGHTS

SIR,—While returning from a village after seeing a case of fibrosis of the lungs (probably specific) and walking through the meadows with the setting sun on my eyes I thought of 1835, when my father as a sub-assistant surgeon was deputed by the Government to hoist the banner of allopathy in remote, uncultured, uneducated areas of Assam villages. The stories that were told are self-instructive and one came out vividly in my mind. Probably it is known that like present-day hawkers sub-assistant surgeons were sent from village market to village market with panniers to let people know that western civilization has brought in a new system of treatment. They were armed with a gramophone to attract people. The existing systems of medicines vehemently opposed this system of medicine and anti-propaganda against the mixing of visible quantity of water came as a death blow to the doctors. The result of this anti-propaganda stood as a stumbling block and my poor father was being heckled by his superiors for not having any patient in well-populated villages. Luckily a thought came unto his head. He took pure nitric acid and a pice in the next market; placed his table and started showing the effect of the acid on the copper. The coppery fume frightened the people and he asked a volunteer if he would dare to have a pure drug like this fiery thing without water.

That had a dramatic effect and the banner of allopathy was hoisted in that village. I, his son, practising near that village, thought of that story. Then I thought of the case that I have just seen. Poor girl has been riddled with all sorts of injection like a bull's eye in a target practice, but nobody has given her a dose of Gees linctus or a grain of pot. iodide. Bhoze Committee says there are too few doctors in India. They never looked into the amount of syringes and doctors' almirahs that are lying astray in the villages. Every Tom, Dick and Harry, who had either been a cook or a household servant of a doctor, is an ambitious doctor. To-day while recognition to some private school doctors are being given the backbone of the medical practice is being kept away from the council. The council and the Harley Street practitioners have probably never thought of these L.M.P.s and L.M.F.s and Tom, Dick and Harry. I thought of my father with his banner and the world war II.

The sun has now set and the dusk was fast approaching, I thought of the sun that has set and the moon that will come. All of a sudden I thought of the 'Committee to consider the claims of the indigenous systems of medicine' and again I thought of nitric acid and copper and of Tom with his aqua distillata injection ampoule with a four anna visits; of Dick and his M&B 693 tablets three a day and eight annas a day practice and of Harry injecting scores of cases as syphilis (dhobies itch). Iron arsenic in anæmia of all description. A target practice in a case of fibrosis of lungs has brought in a questionable reputation to a reputed system of medicine.

Atebrin came as a boon for poor India, but it was thrown out because one in a thousand it may cause insanity, or was it because Tom's syringe will rust? Paludrine is coming, but will it thrive in the rustic soil? Vive la penicillin, but it must be available for Dick's worm-eaten almirah. Ampoules of all descriptions are welcome. Who cares as long as Messrs. So and So can sell all his panacea and Harley Street gets its patients.

I am the only registrable practitioner in about a five square miles area, but my duty has come to giving benediction and hearing the sad tales of how many injections were given and how the lands and herd were sold first to Tom then to Harry and then to Dick. A stethoscope in this area is a radio-active dictaphone which is alive and not only tells the public that a doctor is moving about but also tells the doctor that bronchitis is severe pneumonia and will require glucose injection and a case of heart failure will require glucose.

X.

TETRACHLORETHYLENE POISONING AND TREATMENT

To the Editor, INDIAN MEDICAL GAZETTE

SIR,—Reading in the March 1947 issue of *I.M.G.*, a case with toxæmia due to tetrachlorethylene was brought back to my memory.

In August 1946, I sent an I.O.R. to a local civil hospital to be treated for fever. Malaria was suspected and his temperature touched normal after quinine treatment. The M.O. of the hospital finding the patient to be very anæmic thought the cause to be ankylostomiasis. Unfortunately a microscopic examination of stools was not done, as there were no facilities for it.

He was given three capsules of 15 min. tetrachlorethylene (Allen and Hanbury's) each at hourly intervals on an empty stomach at 7, 8 and 9 a.m. At 10 a.m. he was given the mist. saline 2 oz. At 10-30 a.m. he vomited the saline and was drowsy; about half an hour later he was semi-conscious, just being roused for a minute or two. He vomited once again and then followed the spasms of muscles. The vomitus contained clear watery fluid with a bit of mucus, etc. The spasms were very similar to those of strychnine poisoning. The fits used to come on at intervals of 8 to 10 minutes. In the beginning it was just stiffening of arms and legs, with twitching of facial

muscles. Later, the convulsions were more severe and he was getting opisthotonos. He was unconscious in between the fits. I was informed of his condition as soon as he got his first fit. The available history did not suggest any other cause excepting poisoning by tetrachlorethylene.

Looking up Martindale's Extra Pharmacopoeia (only book available for reference) as to poisoning symptoms and antidote for tetrachlorethylene did not help much. The book said that carbon tetrachloride caused poisoning and that the spasms and convulsions were relieved by calcium chloride intravenously—working on the assumption the tetrachlorethylene is more or less a similar preparation. Calcium gluconate 10 per cent 10 c.c. intravenously was given at 11-30 a.m. Strange to say the patient did not get any repetition of the fits after that. Another injection was given at 3-30 p.m. the same day. He was unable to talk for 3 days. Although he could hear and would ask for food and drinks by signs on the very second day, he recovered fully. Later, he informed that he had no recollection of his experience after the first vomit.

OM PRAKASH, M.B., B.S.

239/241, MOGHUL STREET,
RANGOON.

Any Questions

STORAGE AND USE OF PENICILLIN

1. How long penicillin in dry state retains its potency in ordinary room temperature after it is taken out of cold storage? Does postal transmission which usually takes 3 to 4 days to reach the subdepot from the main depot seriously affects its usefulness?

2. Does its potency gradually diminish, and if so, can it be compensated to some extent by increase in dosage? Is there any difference as regards its loss of potency when it is stored in dry state or in normal saline solution?

3. In outlying countryside, where a refrigerator is not available, is there any justification in its use when the drug has to be kept in ordinary room temperature for a period of 3, 5 or even 7 days?

4. To maintain adequate concentration in blood, injections at three hours' interval are recommended. In outlying places, particularly in private practice in rural areas, such frequent injections are often difficult to continue owing to absence of a doctor in constant attendance. In such instances two or three injections per day may at most be arranged. In such a case, can a modified penicillin *cum* sulfa drug treatment be reckoned superior to sulfa drug treatment alone and is worth giving a trial?

J. C. BHATTACHARJEE, L.M.P.,
Assistant Medical Officer, D. H. Railway.

THAKURGANJ,
PURNEA.

[No. 1. No definite data available. Highly purified crystalline penicillin is reported to retain its full potency at ordinary temperature for quite a long time. Postal transmission which takes 3 to 4 days would therefore not affect the potency of this material.

Commercial penicillin received during the latter part of 1946 are known to be about 80 per cent pure. There is every possibility that this material would retain its potency during postal transmission.

No. 2. Yes, by increasing the dosage to a certain extent this can be compensated. However, both these factors are naturally indefinite and one will have to depend largely on judgment. Penicillin is much more stable in the dry stage than in solutions.

No. 3. Already answered in no. 1. In case of solutions of penicillin however this should be used up within 24 hours.

B. M.

No. 4. It has been considered that two or three peaks of concentration in the blood, reached with a high dose, are as good as a constant medium level.

EDITOR, I.M.G.]

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL M. L. AHUJA, Director, Pasteur Institute, Coonoor, is appointed to officiate as Director, Central Research Institute, Kasauli, with effect from the 8th May, 1947, *vice* Lieutenant-Colonel H. W. Mulligan, granted leave.

Major T. Sommerville, Assistant Director, Central Research Institute, Kasauli, is appointed to officiate as Director from the 14th April to the 7th May, 1947, *vice* Lieutenant-Colonel H. W. Mulligan.

The Secretary of State for India has sanctioned the reversion to military employment of Major H. D. R. Zscherpel of the North-West Frontier Province I.M.S. Cadre, with effect from the 19th April, 1947.

Major R. R. Rao is appointed Medical Adviser (Pensions) (D.A.D.M.S.), in the Defence Department (Pensions Branch), 8th May, 1947.

Major M. Jafar, Director, Public Health, Bengal, is appointed Public Health Commissioner with the Government of India, with effect from the 23rd May, 1947.

(AIR BRANCH)

The officers mentioned below of the I.M.S. (E.C.) are granted Emergency Commissions:—

ROYAL INDIAN AIR FORCE—MEDICAL BRANCH

To be war substantive Flight-Lieutenant

Habibullah Khan Khalil. Dated 7th January, 1947.

Prem Raj Govind. Dated 7th January, 1947.

Puthsala Dharma Raj. Dated 8th January, 1947.

Alla-ud-Din. Dated 27th January, 1947.

Ziauddin Khan. Dated 3rd February, 1947.

Syed Baqir Hussain Gardezi. Dated 7th February, 1947.

Mohammad Aslam Khan. Dated 8th February, 1947.

Ramamurti Arunachalam. Dated 8th February, 1947.

George Antony Paulie. Dated 2nd March, 1947.

Raghibir Singh Rao. Dated 3rd March, 1947.

Dina Nath Maniktola. Dated 4th March, 1947.

Pushpala Venkatrao. Dated 6th March, 1947.

Rama Krishna. Dated 13th March, 1947.

LEAVE

Lieutenant-Colonel Jaswant Singh, O.B.E., Deputy Director, Malaria Institute of India, Delhi, is granted war concession leave for 4 months, for rest and recreation, with effect from the 12th May, 1947.

Captain T. P. Binns, Medical Officer, and His Britannic Majesty's Acting Vice-Consul, Kashgar, is granted leave on average pay for 4 months and 17 days (including additional leave for 1 month and 4 days) combined with leave on half-average pay for 8 months and 17 days, with effect from the 19th October, 1946. On the expiry of this leave his services will be replaced at the disposal of the Director of Medical Services in India.

PROMOTION

Major-General R. Hay, C.I.E., is granted the local rank of Lieutenant-General without effect on pay and pension whilst holding the appointment of Director-General, I.M.S. Dated 12th March, 1946.

RETIREMENTS

Major J. G. Durning. Dated 28th August, 1946.
 Major R. DeSoldenhoff. Dated 5th October, 1946.
 Major S. C. Colbeck. Dated 26th October, 1946.
 Captain G. A. Graham retires, receiving a gratuity.
 Dated 20th September, 1946.

RELINQUISHMENTS

The undermentioned officer is permitted to relinquish his commission :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Lieutenant-Colonel F. M. Graham. Dated 15th July, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Lieutenant-Colonel :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Ty. Lieutenant-Colonel Dwarkalal Narainlal Rai. Dated 3rd August, 1946.

Major Girdhari Lal Puri. Dated 18th December, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are replaced at the disposal of the Government of N.W.F.P. with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain K. A. Jabbar. Dated 22nd April, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are replaced at the disposal of the Government of Mysore with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Major Navaratna Srinivasa Rao. Dated 4th June, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Ty. Major M. M. A. Dubash. Dated 18th June, 1946.
 Major S. N. Seal. Dated 26th August, 1946.
 Ty. Major P. B. Koppiker. Dated 24th September, 1946.

Major K. K. Seal. Dated 14th November, 1946.
 Ty. Major K. S. Iyer. Dated 27th November, 1946.
 Major V. G. Pande. Dated 23rd December, 1946.
 Major S. B. Sinha. Dated 17th January, 1947.
 Major N. S. Sankaranarayanan. Dated 2nd February, 1947.

Ty. Major R. V. Padmanavan. Dated 10th February, 1947.

Major J. C. Sen. Dated 23rd February, 1947.

Major B. Singh. Dated 31st March, 1947.

Major G. S. Sidhu. Dated 10th April, 1947.

Major M. Aslam. Dated 29th April, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Major C. B. Chaudhury. Dated 29th August, 1946.
 Ty. Major K. N. Chakraborti. Dated 8th November, 1946.

Ty. Major P. C. Banerjee. Dated 21st November, 1946.

Major P. N. Roy. Dated 21st November, 1946.

Ty. Major G. J. Bhatt. Dated 26th November, 1946.

Major M. N. Rajan. Dated 27th November, 1946.

Captain S. C. Sarkhel. Dated 22nd December, 1946.

Ty. Major C. M. Nair. Dated 1st January, 1947.

Ty. Major K. N. H. Rizvi. Dated 22nd January, 1947.

Ty. Major U. M. Rao. Dated 5th February, 1947.

Ty. Major S. C. Bagchi. Dated 25th February, 1947.

Ty. Major H. A. Davidson. Dated 5th March, 1947.

Captain M. Ahmed. Dated 9th March, 1947.

Ty. Major N. G. Rajulu. Dated 26th March, 1947.

(WOMEN'S BRANCH)

Ty. Major (Miss) A. M. Pichaimuthu. Dated 21st October, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain M. L. Datta. Dated 10th March, 1946.

Captain F. Khan. Dated 13th June, 1946.

Captain C. N. N. Nambison. Dated 3rd September, 1946.

Captain S. R. Rao. Dated 10th September, 1946.

Captain P. Chandra. Dated 10th October, 1946.

Captain M. K. Siddiqui. Dated 5th November, 1946.

Captain M. V. Singh. Dated 24th November, 1946.

Captain D. C. Banerjee. Dated 1st December, 1946.

Captain G. Venkataramaniah. Dated 4th December, 1946.

Captain G. Das. Dated 17th December, 1946.

Captain G. C. Aubunathan. Dated 2nd January, 1947.

Captain S. K. Bose. Dated 10th January, 1947.

Captain C. S. Mehdiratte. Dated 21st January, 1947.

Captain B. V. Naidu. Dated 1st February, 1947.

Captain N. K. Sen. Dated 22nd February, 1947.

Captain B. V. Shirolkar. Dated 25th February, 1947.

Captain B. Banerjee. Dated 28th February, 1947.

Captain A. N. Lakhota. Dated 11th March, 1947.

Captain P. I. George. Dated 29th March, 1947.

Captain S. P. Bhalla. Dated 5th April, 1947.

Captain S. A. A. Sami. Dated 8th April, 1947.

Captain H. L. Banerjee. Dated 8th April, 1947.

Captain K. P. Datta. Dated 10th April, 1947.

Captain A. A. Carvalho. Dated 14th April, 1947.

Captain P. N. Menon. Dated 15th April, 1947.

Captain M. A. N. Iyengar. Dated 15th April, 1947.

Captain N. I. Sreenivasan. Dated 17th April, 1947.

Captain J. Harinarain. Dated 19th April, 1947.

Captain R. K. Moorthy. Dated 21st April, 1947.

Captain D. C. Chaudhuri. Dated 24th April, 1947.

Captain S. N. Venkataraman. Dated 25th April, 1947.

Captain B. G. Sur. Dated 27th April, 1947.

Captain S. A. William. Dated 27th April, 1947.

Captain G. S. Singh. Dated 27th April, 1947.

Captain M. Ubeidullah. Dated 28th April, 1947.

Captain S. K. Mitra. Dated 30th April, 1947.

Captain B. Mukherjee. Dated 1st May, 1947.

Captain R. N. Sharma. Dated 9th May, 1947.

Captain K. Bhaskaran. Dated 14th May, 1947.

Captain J. C. Chakravarti. Dated 15th May, 1947.

Captain S. R. Rao. Dated 18th May, 1947.

Captain J. F. Guerra. Dated 19th May, 1947.

Captain Gangasani Janardan Reddy. Dated 19th May, 1947.

Captain Syed Sayeeduddin Ahmad. Dated 20th May, 1947.

Captain Anil Chandra Das Gupta. Dated 22nd May, 1947.

Captain Sambhu Nath Datta. Dated 23rd May, 1947.

(WOMEN'S BRANCH)

Captain (Mrs.) Maude Elisabeth Khan. Dated 6th April, 1947.

Captain (Mrs.) Amy Winifred Burrows. Dated 8th April, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of North-West Frontier Province with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain Abdul Azim Qureshi. Dated 14th April, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of Sind from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain Gehi Wadhu Mal Keswani. Dated 22nd May, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are placed at the disposal of the Government of the United Provinces with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain Bishnu Dutta Tiwari. Dated 12th June, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain Tevur Ramanathaiyer Maniyan. Dated 2nd August, 1946.

Captain Parameshwaran Pillai Madhavan Nair. Dated 7th September, 1946.

Captain Attar Singh Nagpal. Dated 18th September, 1946.

Captain Anaikuppam Ramaswami Subrahmanyam. Dated 28th September, 1946.

Captain Thekevetil Ninan Chacke. Dated 17th November, 1946.

Captain Jugraj Saghavi. Dated 16th December, 1946.

Captain Vyasarpadi Loganathan Srinivasan. Dated 30th January, 1947.

Captain Abadul Ghaffar Siddiei. Dated 17th March, 1947.

Captain Bhagwan Das Kumar. Dated 29th March, 1947.

Captain Jagjit Singh. Dated 29th March, 1947.

Captain Suresh Chandra Lahiri. Dated 12th April, 1947.

Captain C. Thomas Simon. Dated 20th April, 1947.

Captain Romendra Nath Chowdhury. Dated 20th April, 1947.

(WOMEN'S BRANCH)

Captain (Mrs.) Manijeh Rustam, Tarapore. Dated 26th June, 1946.

The undermentioned officer is permitted to relinquish his commission on reversion to the Indian State Forces :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain Raghubar Chowdhury. Dated 4th December, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain. Their services are placed at the disposal of the Government of Baluchistan with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain Dhroub Parkash Kapur. Dated 22nd January, 1947.

Captain Abdul Aziz Awan. Dated 21st February, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted rank of Surgeon-Lieutenant :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain K. V. Ganapathy. Dated 24th March, 1947.

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Original Articles

HYPOPROTEINÆMIA DUE TO UTILIZATION OF PLASMA PROTEIN FOR ERYTHROPOIESIS

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RECENT studies on blood protein in cases of nutritional macrocytic anæmia show the incidence of hypoproteinæmia in some of the untreated cases*. In the cases responding well to treatment with hæmatinics, with or without transfusion, along with clinical and hæmatological improvement, there is increase of the blood-protein level as well. The case cited below was an exception. This was a case of severe macrocytic anæmia of pregnancy. Hæmatinics and transfusion of blood raised the blood picture from very low levels to almost the normal level in about a month. But contrary to expectation the patient's clinical condition, particularly the œdema, did not show proportionate improvement in the early stage and the œdema increased still further and spread all over the body in the later stages without any falling off of blood values. Estimation of blood protein in the later stages showed great reduction of total protein which was due mostly to the reduction of the albumin fraction. No treatment was of any avail in reducing the œdema or increasing blood protein, and with the blood picture maintaining the high level, the case closely simulated the clinical entity called 'malignant malnutrition' (Trowell and Muwazi, 1945). The patient died within a few months.

During recovery from anæmia generalized œdema due to hypoproteinæmia was noted in a vegetarian by Holmes (1944) and in a case of pernicious anæmia with faulty dietetic habit by Davies (1945). In both the cases the condition was relieved with transfusion of plasma and change over to high protein diet. Thus, these two cases differed materially from the case cited below which, as mentioned above, terminated fatally in spite of all treatment.

Case note

Mrs. S. D., 33, multipara, belonging to lower middle-class, was reported to be a chronic sufferer from diarrhœa for over 2 years and was reported to have had an attack of malaria in 1943. She was admitted into the Carmichael Hospital for Tropical Diseases in 1944 for her diarrhœa. Repeated examinations of the stool failed to

show any pathogenic organism. Her diarrhœa was however brought under control and she was discharged as a case of nutritional diarrhœa. After discharge from the hospital she had occasional bouts of diarrhœa.

The patient became pregnant in April 1945 and it was reported that before her conception she was in indifferent health and had also some degree of anæmia. With the progress of pregnancy her anæmia increased and later she developed some œdema. She was admitted into Chittaranjan Seva Sadan on 16th December, 1945, where she was delivered of a male child on 18th December, 1945. Reports from Seva Sadan indicated that she was very anæmic and had œdema all over the body; she was also running a low intermittent temperature. Treatment with hæmatinics and two blood transfusions for about a month did not improve her condition and she was transferred to the Carmichael Hospital for Tropical Diseases on 19th January, 1946, for the treatment of her anæmia.

On admission, the patient was found to be distinctly orthopneic with visible carotid pulsations. She had a distressing cough but expectoration was scanty. The general condition of the patient was very low and she was running a slight temperature. The patient looked very pale, the face was slightly puffy and she had moderate degree of œdema over the feet and legs and slight œdema in the sacral region.

The spleen was enlarged about one inch below the costal margin and the liver was also enlarged about one inch and was slightly tender. The heart was slightly dilated and hæmic murmur was audible over the pulmonary area. The pulse was of water-hammer type and the blood pressure was 106/35. Fine crepitations were heard over the interscapular region of both sides.

Laboratory and other findings :—

Blood :

Blood picture	.. See table and graph
Blood proteins	.. See table
Blood cholesterol	.. 0.070 per cent
Blood urea	.. 0.0232 "
Aldehyde test	.. Negative "
Complement-fixation test for kala-azar.	.. "
Wassermann reaction	.. "

Stool.—Nothing abnormal found on repeated examinations.

Urine.—Repeated examinations showed only traces of albumin.

Sputum.—No acid-fast bacilli on repeated examinations.

Skiagram of the chest.—No lung infiltration seen.

Fractional gastric analysis.—Hypochlorhydria.

Treatment.—See graph.

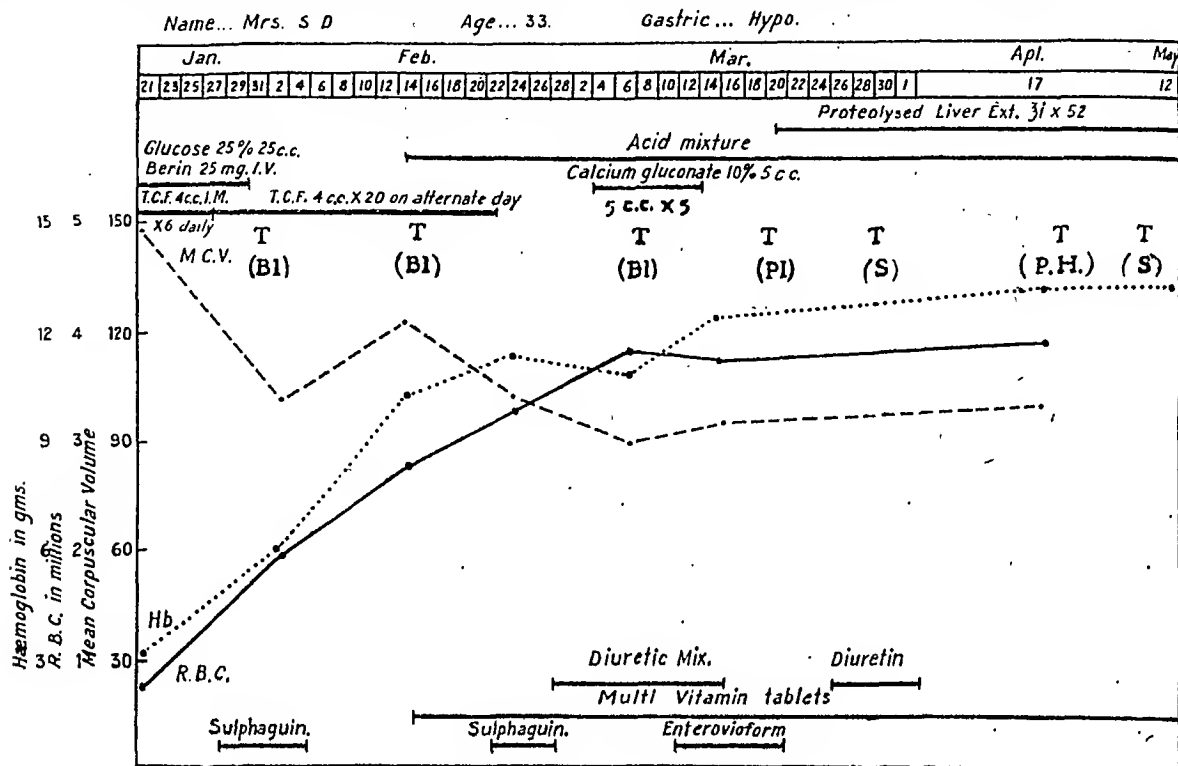
Progress

With transfusion of blood and hæmatinics the blood picture improved very rapidly from the

* Unpublished observations.

very beginning and reached a high level in about a month and showed still further improvement later on. With the improvement of blood picture

pickles (*achár*) and fried rice (*mudi*). Strict vigilance on her diet and a course of enterovioform helped to control the diarrhoea,



BI = Blood. PI = Plasma. S = Serum. P.H. = Protein hydrolysate.

the patient's general condition improved considerably, the patient was no longer orthopneic and the cough was not distressing. But even then the clinical improvement was never proportionate to the hæmatological improvement. The œdema after slight initial improvement was found to be increasing again after the third week and gradually the œdema spread all over the body and there was fluid in the peritoneal cavity

The slow intermittent temperature was completely off by the third week and thereafter the patient continued to be afebrile.

On account of persistent œdema, the blood protein examined again by the copper sulphate method and later by microkjeldahl method was found to have gone down considerably below the level found on admission with marked fall in albumin fraction (*see table*).

TABLE

Date	R.B.C. (millions)	Hb. (gramme)	M.C.V. (cu. μ)	W.B.C. (thousands)	PROTEIN			Treatment
					Total (per cent)	Albumin (per cent)	Globulin (per cent)	
21-1-46	0.77	3.16	149.4	7.8	5.4	2.9	2.5	See graph.
1-2-46	2.02	6.18	103.9	..	..	..	..
22-2-46	3.40	11.5	105.9	7.7	..	..	..
13-3-46	3.78	12.5	97.8	7.4	3.0	..	..
17-4-46	3.95	13.4	103.8	5.7	..	..	..
3-5-46	..	..	..	..	2.8	1.0	1.8
12-5-46	3.90	13.2	..	..	..	..	..

as well. No treatment was of any avail in reducing the œdema which persisted till the very end.

The initial diarrhoea was brought under control with sulfaguanidine, later she again developed diarrhoea which did not improve with sulfaguanidine. It was then detected that the patient was surreptitiously taking

Discussion

The most notable clinical feature in this case was that though the blood picture improved rapidly with hæmatinics and transfusion of blood, in fact, more rapidly in the early stages than is usually seen in similar cases of macrocytic anæmia of pregnancy, the œdema, after slight initial improvement, began to increase

again after the third week of treatment, when the blood values were still increasing. From that time the oedema increased more and more and spread all over the body though the blood picture continued to be within the normal range. On admission, with a red cell count of only 0.677,000 per c.mm. and with hæmoglobin value of 3.16 gm., the total blood protein was only slightly below the normal range. Estimation of blood protein at a later date, when both the red cell and hæmoglobin had reached almost the normal level, showed marked hypoproteinæmia with greater reduction of the albumin fraction and consequently an altered albumin-globulin ratio. This would explain the recrudescence of the oedema, but what could be the pathogenesis of the development of the hypoproteinæmia, which afterwards turned out to be one of malignant hypoproteinæmia, if we may use the term. Infection as a cause of the lowering of the plasma protein can be ruled out on clinical grounds and on negative laboratory and x-ray findings. Is it then possible that the unusually brisk erythropoiesis, the increase of red cells at the rate of 0.125,000 per c.mm. and of hæmoglobin at the rate of 0.3 gm. per diem for the first ten days in such a patient, was possible only at the cost of the plasma proteins with consequent lowering of the plasma proteins? That this was not only probable but quite feasible will be seen from the works of Whipple (1938, 1942). Whipple contends that 'the reserve stores of protein-building materials from which the body can manufacture hæmoglobin, plasma protein or cell protein are largely in the form of protein within cells' and 'that liver is actively concerned in the production of plasma proteins and of the globin', which constitute the bulk of the protein content of the hæmoglobin. 'These reserve stores may be reduced to low levels by fasting or a long period of low protein diet or reduced practically to zero by long-continued anæmia or by plasma depletion during periods of low protein diet'. Whipple envisages that 'food through amino-acids contributes to the cell proteins of liver-muscle and body tissues. The liver cell (and its protein) contributes directly to plasma protein and hæmoglobin. There is an important protein exchange which may go on within the body'. 'The plasma protein contributes easily to body protein needs (muscle, liver and hæmoglobin)', but 'other tissues can contribute only with difficulty to plasma protein by this method of exchange (after the reserve stores are depleted). Other tissues contribute easily to hæmoglobin (for example, in fasting) but hæmoglobin can less readily if at all contribute to other body proteins'. Convincing proof of the theory that hæmoglobin may be formed with the help of plasma protein is afforded by the experiments on fasting anæmic dogs. Whipple (1942) concludes that 'hæmoglobin in its production may draw on the plasma protein but hæmoglobin stands apart in the protein economy and does not contribute freely to the protein pool. On

the other hand, the body guards jealously the fabrication of hæmoglobin and, given a real need for both plasma protein and hæmoglobin, the protein flow favours hæmoglobin, which under these circumstances always is produced in more abundance than the plasma protein'.

On the basis of Whipple's theory, the development of hypoproteinæmia in the reported case could be explained in the following way: The reserve store of protein-building material was brought to a very low level, may be to zero level, by long-continued anæmia together with the restricted diet on account of diarrhoea and finally by loss of blood during childbirth. The brisk hæmopoiesis, following liver therapy at this stage, could only be possible from utilization of the plasma protein more so as the patient could not or rather would not take sufficient protein by mouth on account of diarrhoea. The recrudescence of the oedema just at the end of the brisk erythropoiesis would lend support to this. Continued improvement in the blood picture in the absence of sufficient protein diet was responsible for further lowering of the plasma protein, which later was found to have gone down to very low level with altered albumin-globulin ratio.

Summary and conclusion

In response to the stimulus of potent liver extract hæmoglobin and red cells were formed in great abundance in a very debilitated case of macrocytic anæmia after confinement. The increase in the hæmoglobin and red cells was followed by fall in the plasma protein to a very low level from which it could not recover. It has been suggested that the lowering of the plasma protein was due to utilization of plasma protein for the formation of hæmoglobin. For, it has been argued that on account of the depletion of the protein reserve of the body, and in the absence of sufficient protein from the food, formation of hæmoglobin could only be possible by utilization of plasma protein, a not too unusual procedure under certain conditions.

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FURTHER OBSERVATIONS ON PLAGUE

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In the June-July 1946 number of the *Indian Medical Gazette* we published a report on

1,000 cases of bubonic plague treated in an emergency plague hospital. Here we deal with a further 700 cases treated with sulfamerazine, the value of inoculation, our experience with temporary village plague hospitals and general anti-epidemic measures.

Sulfamerazine in bubonic plague

During the period from July 1946 to January 1947, 700 consecutive cases of bubonic plague were treated in the Kolhapur Plague Hospital with sulfamerazine.* From the outset sulfamerazine appeared to have the great practical advantage that the interval between doses can be prolonged to eight hours instead of four hours as with sulfadiazine. In an overcrowded emergency hospital this very considerably reduces the work of the staff administering the drug. Thus even if sulfamerazine showed no clinical superiority over sulfadiazine it would still remain the drug of choice.

Apart from the variations in dosage described below, all patients received the same general nursing care. Great attention was again paid to an ample intake of fluids, but instead of doing this by the intravenous route, as in a previous series, we generally gave unconscious patients fluids (normal saline-glucose) by nasal catheter. This we found to be most satisfactory if started before there were any signs of collapse and it was, of course, simpler, quicker and much cheaper.

We started with a series of 100 consecutive cases of bubonic plague in which we gave no injections. The dose of sulfamerazine was: initially six tablets (3 grammes), then two tablets six hourly. In this series we had 19 deaths of which 6 were moribund (i.e. death within 24 hours of admission). The average duration of fever was 3.6 days among recovered cases and the average duration of hospitalization was 7 days. We gathered the impression that the effect on the temperature was not as prompt as we had been accustomed to see after sulfadiazine injections. We also noticed that the buboes became exceedingly painful from the second day of treatment onwards, a phenomenon we had not previously observed. We further experienced retention of urine in a much larger percentage of cases than previously observed. We attributed this to the very high dose of sulfamerazine which was in excess of that advised by the manufacturers.

For these reasons we changed our dosage schedule in the next 100 cases to one injection of $2\frac{1}{2}$ grammes in 50 c.c. of glucose intravenously on admission and then two tablets eight hourly instead of six hourly as in the previous series. In this series we had 15 deaths of which 6 were moribund and 9 non-moribund. The average duration of fever was 3.2 days and the average

duration of hospitalization was 6.3 days. The results of this schedule were therefore slightly better than in the first series. Retention of urine occurred only in a single case. We attributed these better results to the rapid action of the intravenous injection and to the decrease in dosage.

Having convinced ourselves of the advantage of an initial injection we again changed our schedule in the next 100 cases to two injections eight hours apart, the first of 2.5 grammes and the second of 1 gramme and continued with one gramme of the drug orally given at eight hourly intervals. In this series there were only 12 deaths of which 4 were moribund and 8 non-moribund. The average duration of fever and the average stay in hospital were 2.7 days and 6.1 days respectively, thus showing an improvement over the first and second series. As our figures appeared to improve with the number of injections given, we tried a few cases giving four to five injections without any oral treatment. Though in these cases the temperature came to normal they all relapsed after a few days and had to be treated again with injections and tablets. We, therefore, abandoned work along these lines and tried another series of 100 cases with three injections, initially 2.5 grammes then two injections of 1 gramme each eight hourly after which tablets (one gramme per dose) were given eight hourly. In this series we had 14 deaths of which 4 were moribund and 10 non-moribund. Though this result was not quite as satisfactory as in the previous series as regards the mortality we were none the less impressed with the rapid fall in temperature and the control of toxic symptoms both of which appeared to be better than in the two-injection series. We, therefore, decided to continue on this schedule and treated 400 consecutive cases in this way. In this series of 400 cases the average stay in hospital of recovered cases was 5.9 days and the average duration of fever 3.3 days. The total mortality was 14 per cent and the non-moribund mortality was 7.2 per cent. We observed no toxic effects attributable to the drug: there were no rashes and no urinary complications. Though the average duration of fever worked out to 3.3 days, the majority of cases was normal within 24 hours; the high average is due to the inclusion of some cases with extensive cellulitis and severe hæmorrhagic cases in which the temperature took a long time to subside completely.

Sulfamerazine versus sulfadiazine

In our previous work with sulfadiazine we found a total mortality of 18 per cent and in non-moribund cases 8 per cent while sulfamerazine (three-injection series) showed a total mortality of 14 per cent and 7.2 per cent in non-moribund cases. There thus appears to be a slight (perhaps not statistically significant) superiority of sulfamerazine. It must, however, be pointed out that in our sulfadiazine cases we

* Messrs. Sharpe & Dohme very kindly placed at our disposal, free of charge, all the sulfamerazine we required.

used far more than three injections. Apart from the recorded facts the clinical observation of cases distinctly gave us the impression that sulfamerazine is superior; that in the dosage used in the last series the initial drop in temperature after the beginning of treatment was more rapid. The great advantage of a longer spacing between doses has already been stressed.

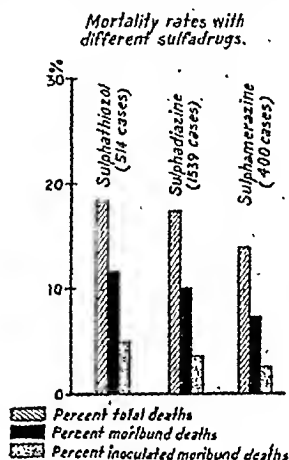


Fig. 1.

Figure 1 shows a comparison between the mortality rates of hospitalized patients treated with sulfathiazole, sulfadiazine and sulfamerazine. It is significant that in the sulfathiazole group the majority of cases was from Kolhapur City and that later cases in the sulfamerazine group were mostly from outlying rural areas and frequently admitted in a collapsed condition after a long journey. We are inclined to believe that all other factors being equal sulfamerazine would show a more marked superiority than our figures indicate. That under these circumstances there is a decline in moribund deaths can only mean that a larger number of cases could be made to survive the first 24 hours. It is also significantly in favour of sulfamerazine that in this group the percentage of inoculated cases was lower than in either of the others.

We are satisfied that sulfamerazine used according to our last schedule is, so far, the drug of choice in the treatment of bubonic plague.

Village plague hospitals

The more popular the Kolhapur Plague Hospital became the longer became the distance that patients travelled to seek admission and the more clear it became to us that a long and difficult transport after the onset of plague lowered the chances of recovery very considerably. Generally speaking, our moribund cases were ones that had been transported from a long distance before admission. Once this was clearly realized that we decided to start temporary emergency village plague hospitals in the middle of affected areas so that patients could be admitted without the dangers of a long transport, usually in a bullock cart. In two such temporary village hospitals a total of 316

patients was admitted. Among these there were 31 deaths, representing 10 per cent mortality. Of these, 13 were moribund and 18 non-moribund. The non-moribund mortality was therefore only 6 per cent. All these cases were treated with sulfadiazine. It is interesting to note that these results, achieved under very primitive village conditions, are even better than those of the city plague hospital; entirely, we think, due to the fact that these cases were admitted from a radius of only a few miles which may also account for the low number of moribund cases (4 per cent of total admissions compared with 11 per cent in the Kolhapur City Hospital).

It does, therefore, seem to be of the greatest importance to bring adequate facilities for treatment right into the midst of an affected area and to have a number of such emergency field hospitals rather than to concentrate the cases in a large central hospital situated possibly at some considerable distance from the affected area. We shall refer to these village hospitals again further on.

The value of inoculation for improving the chance of recovery

Among a total of 2,753 cases treated in the hospital there was a total mortality of 17 per cent and a non-moribund mortality of 8.5 per cent. Of these 2,753 cases, 1,400 were inoculated and 1,353 were uninoculated. Among the uninoculated the total mortality was 21.2 per cent and among the inoculated it was 12.9 per cent. Similarly the non-moribund deaths were 10.8 per cent among uninoculated and 6.3 per cent among inoculated (see figure 2). Contrary to our fears

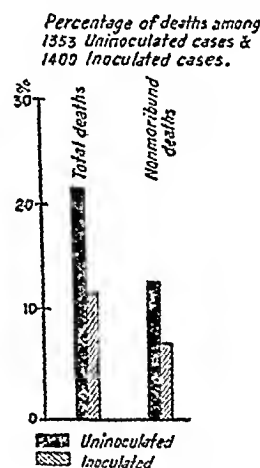
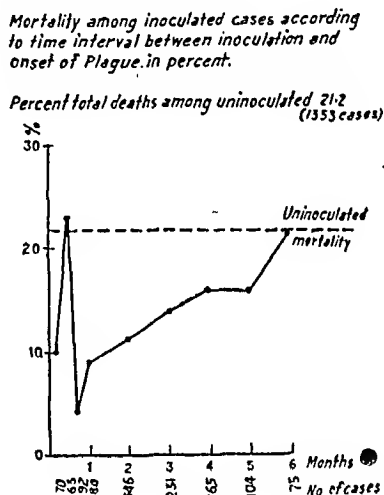


Fig. 2.

expressed in a previous paper, the analysis of a much larger series does, therefore, show that inoculation, to some extent, enhances the chances of recovery.

In order to demonstrate the relation of the lapse of time between inoculation and attack and the improved chance of recovery we have in figure 3 plotted the total mortality rates per cent against the period between the date of inoculation and the date of attack. This figure

confirms our previous view that between the first and second week after inoculation the mortality is very high. During the third week the mortality drops to its lowest and after six months



it returns to the level of the uninoculated. The fact that the mortality in the first week is unexpectedly low might indicate that inoculation, i.e. during the incubation period, boosts an immunity mechanism which has already started to function; but that an infection acquired during the 'negative phase' caused by the inoculation, i.e. shortly after inoculation, is particularly virulent.

If practical conclusions can at all be drawn from our limited material they would be: first to refrain from inoculating immediately exposed persons such as those living in the close vicinity of a case and secondly to set the period of increased resistance after inoculation at a maximum of 4 months for a single injection.

General anti-epidemic measures

Since our earlier report in which we emphasized the value of cyanogas, considerable further studies have led us to modify our views.

We have on several occasions seen that cyanogassing a whole plague-affected village with the utmost care and thoroughness combined with the use of kerosene-soap emulsion has had disastrous result never observed in the city where the whole inhabited area could not be covered in 2 to 3 days. Within 2 weeks of our enthusiastic efforts we have seen a sudden and alarming rise in incidence occur in such thoroughly treated villages. The only explanation is a too radical destruction of rats and the merely ephemeral effect of kerosene-soap emulsion on fleas.

We, therefore, decided to use D.D.T. on a large scale. In this we were handicapped by a severe shortage of kerosene though we had ample crude D.D.T. available. At first we tried to blow D.D.T. dust on the floors. This did not work because as soon as the squad turned their

backs the floor would be swept 'clean' by the house-owner. It was, therefore, decided to mix crude D.D.T. in a proportion of 1 in 4 with fresh cowdung and to spread this mixture in the usual way on the floors of village houses. A few pilot experiments in the laboratory had shown this mixture thinly spread to be rapidly lethal to rat fleas. This method, though very wasteful in D.D.T., proved to be the most successful we have so far employed. We have collected dead fleas in large numbers from rooms treated in this way. After the second or third day it was hard to find more fleas but the floors continued to be lethal to other insects as long as the house-owners could be prevented from applying a fresh coat of dung containing no D.D.T. Now that water miscible D.D.T. is available the kerosene and the transport difficulties are solved and we can at last apply it to floors and walls with sprayers.

We consider it the ideal routine in plague control to treat the focus of an outbreak with D.D.T. at once and intensively and to do no rat-baiting or inoculation in the focus. The surrounding unaffected villages, however, should be inoculated (if funds and staff permit) and in any case subjected to intensive anti-rat measures and given a blanket D.D.T. treatment of all houses, if the village is near, or in direct communication with, the affected one.

The occurrence of 10 simultaneous plague cases in one locality within a 4-mile radius we consider sufficiently serious to call for the immediate establishment of a village plague hospital which can be opened within a few hours and which closes down as soon as no further cases are reported. These village hospitals are run by doctors deputed from the Kollhapur Plague Hospital who have had special training. The villages provide room, furniture and menials and pay for drugs, food, etc., from voluntary contributions or village funds. Our difficulty has not been to get such hospitals going, on the contrary we have often had to dissuade village enthusiasts from opening a hospital for an occasional sporadic case. We usually select a hall in which men, women, children and all castes and creeds are accommodated together in order to save staff and make supervision easier. The fact that there is no criticism of this arrangement and that the villagers are intensely proud of their recovery records and gladly admit outsiders from adjoining non-State territory to 'their' hospital is certainly encouraging evidence of 'rural uplift'.

Where such measures are adopted we discourage the villagers from leaving their houses and camping in the fields, because our experience shows that the incidence of plague among those that have fled is usually higher than among those that have stayed at home, safeguarded by D.D.T.

Of all these measures we consider inoculation the least important; it is by far the most expensive and enjoys none of the universal

popularity of the other measures. Particularly the blanket D.D.T. treatment has an incredible effect on village morale owing to the incidental riddance of bedbugs, flies and other pests for which the villagers are intensely grateful.

As it has been possible to apply these measures to all outbreaks occurring in the State, the population have, to a very great extent, lost their dread of plague. They have come to look upon it as a severe but brief illness from which one generally recovers and which is far less serious than typhoid. It is easily recognizable and our villagers now know exactly what to do. Forty-eight hours' delay between the reporting of a case and the arrival of an anti-epidemic squad, even in remote villages, usually results in a formal deputation politely suggesting gross inefficiency on the part of the Health Department, a welcome sign indeed. The complete absence of panic makes sanitary measures much easier to apply. Plague is rapidly becoming a controllable disease. It is still very expensive to control, but the old attitude of helpless horror is fast waning.

Summary

1. Sulfamerazine, the drug of choice, in the treatment of bubonic plague.
2. The importance of emergency village hospitals.
3. Inoculation to some extent improves the chances of recovery, particularly during the 2nd, 3rd and 4th months after inoculation.
4. The danger of too thorough rat-destruction.
5. D.D.T. in rural plague control.

Acknowledgments

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BLACKWATER FEVER

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DURING the period of my service for the last six years at Jalpaiguri I had opportunities to see quite a large number of cases of blackwater fever. The disease is very prevalent in Duars of Jalpaiguri, Terai of Darjeeling and also moderately in other parts of Bengal.

Economic loss to the population due to this disease is not inconsiderable. Loss of earning *per capita* due to death is a small factor, but the greatest loss sustained is due to disablement after an attack of blackwater fever. The victim is in constant dread of a relapse and leads a life of semi-invalidism, unable to work hard and earn as much as a healthy man.

The worst sufferers are middle-class people, who are to work hard, often pass sleepless nights and are careless about their diets. They are generally constipated, often suffer from mild attacks of malaria which they generally ignore or at least treat with only occasional doses of quinine. On the other hand, the poorer class, the tea garden coolies and the Santhal cultivators of Duars, who are in the habit of taking daily 'panchai' (fermented rice) and 'toddy', are comparatively free from this disease, though they often suffer from recurrent attacks of malaria. It may be that 'panchai' and 'toddy' contain vitamin B which may play some rôle in the prevention of blackwater fever and opens a field for investigation. The Europeans of Duars and Terai are also comparatively immune, although they stay there for years together and take quinine almost daily along with whisky, brandy or beer.

The onset of the disease is always very sudden. There is chill and the patient takes a few grains of quinine salt and to his horror he finds that he is passing tarry black or deep red urine. Incessant vomiting sets in, the skin and the conjunctivæ of the eyes become canary yellow, and the patient becomes very restless and writhes in agony. The consciousness is never lost and the mind is clear up to the end. The temperature rises up to 102°F. or more. As long as urine is passed in good quantity, be it black or light coloured, there is every chance of recovery. If it stops and hiccough starts, the situation is extremely grave. The suppression of urine may continue till death or after sometime, 2, 3 or 4 days or longer, there may be free urination and the patient's life is saved. In a case of mine there was total suppression of urine for as long as seven days during which period the patient did not pass a drop of urine in spite of all possible treatment, and then all of a sudden, after seven days, he passed about 2 pints of clear urine and the crisis was over.

The suppression of urine is not necessarily due to mechanical obstruction of the kidney tubules, but may be due to temporary suspension of the activities of the kidneys allied to shock.

It is a self-limited disease, generally curing itself. Sometimes a course of slight fever comes in the wake which is often refractory to all treatment and ultimately leads to the death of the patient.

The disease never confers immunity. Relapses are common. It is quinine that precipitates attacks.

The havoc wrought on different organs of the body is not inconsiderable. Massive destruction of red blood cells is a special feature. The liver tries to put a check to it by sending out lipoids and reconverting lost iron into corpuscles. Soon it gets overworked and shows signs of necrosis. Heart suffers from malnutrition due to less number of oxygen carriers and the increased blood acidity leads to the injury of the heart.

muscle. The kidneys try to eliminate the stroma of broken red cells and also the excess of accumulated acids. They get enlarged, tubules are degenerated, and filter heads clogged with stroma and hæmoglobin infarcts.

Treatment

1. Hydrarg subchlor in fractional doses with chloretone and ice to suck give the best result in checking vomiting.

2. Injection of atebirin and plasmoquin.

It is questionable if they are at all indicated in blackwater fever. They can be given with good result only when the blood shows malarial parasites. On the other hand, we have seen that blackwater patients, who are generally very much afraid to take quinine (and I think that they are justified) during their subsequent attacks of malaria, have often developed blackwater fever after taking atebirin and plasmoquin. So I think they are not absolutely safe as has hitherto been considered.

3. Injection of pedunculine or vitex peduncularis by mouth.

As there is excessive vomiting, we prefer injections. Pedunculine 3 c.c. intramuscularly or intravenously once or twice a day gives very good result and often produces free diuresis.

4. Glucose and sodi bicarb.

As there is damage to the kidneys, I prefer 5 per cent glucose solution 100 to 200 c.c. with sodi bicarb 7½ per cent 25 c.c. intravenously once or twice daily for loss of fluid and increased H ion of the blood and to maintain the heart.

5. Salines—subcutaneously, intramuscularly, intravenously or per rectum—are highly advocated in textbooks for the treatment of blackwater fever. But are they justifiable in view of the fact that inflammatory changes occur in the kidneys with chloride retention in some cases and do they not cause more damage to the kidneys?

Plenty of fluid in the form of plain water, dab (green coconut) water and glucose water should be given for dehydration.

6. Calcium, vitamin C and vitamin K have been freely introduced as adjuvant treatment.

7. Penicillin.

In November and December 1946 there were several cases of blackwater fever in Gooshkara (district Burdwan) and I was told by the attending physicians of the locality about the high mortality of the blackwater fever cases there. Thorough investigations were made in two cases which I saw—they were real blackwater fever cases and both were highly toxic. But the blood count in one was 14,000 white cells and 85 per cent polymorphonuclear cells and in another 13,000 white cells with 91 per cent polymorphonuclear cells, although I could not detect any inflammatory evidence anywhere clinically. Penicillin was tried—20,000 units intramuscularly every three hours, total 600,000 units in one case and 1,000,000 units in the

other—along with intravenous glucose and sodi bicarb. One case rallied in a week but the other took one month for complete recovery.

It is too early to say anything definitely about the rationality and efficacy of penicillin treatment of blackwater fever, but as I was very much impressed with the results I have thought them worth recording.

8. Blood transfusion.

Only in one case it was possible—about 500 c.c. were transfused—the patient survived.

9. For suppression of urine, alkalies in massive doses, plenty of bland diluents to drink, hot fomentations and application of anti-phlogistin or linseed poultice over the loins, dry cupping, continuous rectal administration of alkalies and 5 per cent glucose by drip method, intravenous injection of 5 per cent glucose 100 to 200 c.c., and in suitable cases injection of caffeine sodium benzoas may all be tried.

10. After infection fever is very hard to control. Mixed vaccines, iron and liver extract have done some good in many cases.

Sudden failure of the heart is baffling to the physicians. The patient apparently cured may drop down dead as soon as he attempts to sit on bed. It may be due to coronary blocking owing to formation of intravascular clots after liberation of a large quantity of thrombokinase from massive destruction of red blood corpuscles or due to damaged myocardium.

It is now admitted that H ion poisoning is the main factor for extensive hæmolysis. If it were so, blackwater fever could be induced by injecting any acid or by giving any acid by mouth. If hæmolysis were due to quinine alone acting as a detonator, then quinine has something to do with the hæmolysins produced somehow in the blood and may be working in combination. It may be that at certain stages of sporulation of malarial parasites a large quantity of hæmolysin is produced which is perfectly neutralized where the blood is in physiological state. These are some of the doubts that come upon the present conception of blackwater fever which future workers may be in a position to clear.

TREATMENT OF AMŒBIC DYSENTERY WITH E.B.I. RETENTION ENEMAS

By S. J. GROSS, M.D.

Chirala, M. and S. M. Ry.

AMŒBIC dysentery is an infection of the colon with *Entamœba histolytica* (EH) which, except in cases of metastatic abscesses, very seldom resides in other organs. The colon is normally inhabited by a number of other bacteria. It is beyond the scope of this paper to discuss the rôle of these bacteria in the pathology of amœbiasis. However, it has to be mentioned that the amœbæ grow better in the presence of certain bacteria and that, to my belief, certain symptoms generally ascribed to the amœbic

infection are caused by these bacteria. The latter enter the organism *via* the intestinal lesions caused by the amoebæ, and may produce a *B. coli* sepsis for instance. None of the various drugs and methods advocated for the treatment of amoebiasis has given complete satisfaction. The oral drugs like the arsenic and quinoline compounds do not eradicate the infection, emetine injections do not affect the cysts, and emetine-bismuth-iodide combined with the chiniofon enemas requires hospitalization. The ideal would be an ambulatory treatment.

It has been established that *in vitro* emetine is an excellent amoebicide, but does not affect the cysts of *EH*. Emetine-bismuth-iodide has the advantage that it also destroys the cysts. Therefore, these drugs should give excellent results in the treatment of amoebic dysentery, provided they are given in the proper manner. This led to a reconsideration of the usual methods of treatment.

Parenteral route.—Emetine is given by injections. In this manner only a small fraction of the drug can, and will, reach the colon where its action is desired. A greater portion will be distributed all over the body. Thus it will affect also healthy tissue, as emetine is a plasma poison, and the toxic effects of emetine are well known. On the other hand, investigations by Laidlaw, Dobell and Bishop have shown that even such a small concentration of emetine as 1 : 5,000,000 was lethal for *EH in vitro*, if it were in constant contact for a period up to 4 days, and provided that the medium did not become too acid. In later experiments Dobell grew amoebæ in a culture containing one strain of bacteria only. There he found that the amoebæ were unable to survive for 3 or 4 days in emetine concentrations of less than 1 : 5,000,000.

Oral route.—Only a small portion of the drugs given by mouth will reach the colon where their action is desired. A greater portion will be absorbed in the intestinal tract or be transformed by the digestive secretions. In this connection I want to cite Manson-Bahr: 'From observations made by sigmoidoscopy it has been found that the most intense amoebic ulceration is present in the sigmoid colon and in the lower part of the rectum, in a position where it is improbable that *E.B.I.* can any longer exert its full action'.

Rectal route.—In view of the above it has to be concluded that the best method would be to introduce the medicaments directly into the colon and rectum. Manson-Bahr attempted to introduce emetine directly into the bowel. This caused a considerable amount of pain and was by no means successful. 'When given in a dilution of 1 : 4,000 (4 grains of emetine in 10 oz. of normal saline) violent spasms were produced and a parasitic relapse of amoebic dysentery with blood and mucus in the stools ensued.' I contend that this treatment was unsuccessful for

the following reasons. Nobody would ever dare to give a single injection of 4 grains of emetine as this would be too toxic. The drastic action had to be expected, because emetine being a plasma poison will in this concentration damage also the healthy tissue of the bowels. The strong concentration of emetine will cause irritation and subsequently there will be diarrhoea with mucus and blood from vessels which have been damaged.

I gave emetine-bismuth-iodide (*E.B.I.*) as retention enema, and after trial and error I arrived at the following formula for the retention enemas:—

R Emetine-bismuth-iodide	..	..	1 gr.
(or			
Kurchi-bismuth-iodide	..	..	1 gr.
plus Emetine	..	..	$\frac{1}{2}$ gr.)
Sulfonamide	..	..	10 gr.
Sodium bicarbonate	..	..	10 gr.
T. opii	..	..	5 mins.
Tragacanth or gum	..	..	5 gr.
Water	ad	..	1-2 oz.

Comment.—At first I used only *E.B.I.*, and when I could not get it any more, I tried kurchi-bismuth-iodide (*K.B.I.*), but the results with *K.B.I.* were disappointing. Therefore, I added a $\frac{1}{2}$ grain of emetine to *K.B.I.*, as $\frac{1}{2}$ grain is roughly the amount of emetine in 1 grain *E.B.I.*

The results with *K.B.I.* plus emetine were subsequently as good as with *E.B.I.* The sodium bicarbonate was added because emetine acts best in an alkaline medium. Sulfonamide was given to inactivate the intestinal bacteria which might support the growth of the amoebæ as these grow better in the presence of certain bacteria. Moreover, the sulfa drugs will be useful against an eventual concomitant *B. coli* infection. *T. opii* was added because in some cases the enemas caused irritation and cramps. Tragacanth was needed to suspend the drugs like in an emulsion, and to prevent that the drugs are reabsorbed too quickly from the bowels.

The enemas were given after defecation so that its contents should not be absorbed or diluted by the fæces, and to ensure that the drugs come into direct contact with the wall of the bowels. A fairly even distribution of the enema can be assumed, as peristalsis and anti-peristalsis will move the contents of the colon forwards and backwards. I have the impression that the enema forms a film all over the colon, because pains indicating a lesion in the area of the cæcum were also relieved with this method. The enemas were given daily for 8 days; 8 administrations constituting one course. All patients were treated as out-patients. No special diet nor directions were given during treatment, except that I gave vitamin B to some patients who were rather weak and where it was feared that the sulfas might interfere with the absorption of vitamin B from the intestines. All patients were able to continue their work. In a number of cases retention enemas proved successful where all other treatments had failed.

The majority were relapsing or chronic cases. All patients who were still positive after the first course, whose motions still contained *EHs* or cysts, were given a second course after an interval of 4 days.

The following cases may serve as an illustration :—

Case 1.—Mr. A. C., 31 years old, complained of flatulence, weakness and abdominal pains, most painful points being cæcum and sigmoid. Microscopical examination of the stools showed *EHs* and cysts. Patient was given a course of emetine injections and simultaneously enterovioform by mouth. Patient felt subjectively better, but re-examination of the motion still revealed cysts. Some weeks later he complained again about pains. He was now given E.B.I. retention enemas for 8 days. During the first 3 or 4 days patient reported diarrhoea with mucus and abdominal cramps. These symptoms subsided gradually. After 8 days still cysts were seen in the stool. Four days later he was given another course, and this time there were no manifestations. At the end of the second course which was tolerated much better, all his symptoms disappeared, and repeated examinations did not reveal any *EHs* or cysts.

Case 2.—Mr. C. R., 43 years old, had a history of hookworm infection and of gastric ulcer. He complained of vague pains round the umbilicus. Cysts were found in his stool. He was treated with enterovioform, but though the symptoms improved, a control examination showed cysts to be still present. Patient was then given a course of E.B.I. retention enemas. At the end of this course cysts and *EHs* were found in his motions. A second course was given, and thereafter the stool was free of *EHs* and of cysts. The patient was re-examined at regular intervals, but no parasites were found nor did he have any further complaints.

Case 3.—Mr. E. K., 39 years old, gave a history of pains in the left groin. He had been under medical treatment for a long time. As the patient did not improve with any treatment given, his stools were examined and cysts found. After a course of emetine and of enterovioform, he was slightly better, but parasites were still present. Several ulcers were seen on rectoscopical examination. Kahn positive. Patient was then put on N.A.B. injections, and simultaneously he was given E.B.I. retention enemas. A subsequent stool examination showed *EHs* and cysts. A second course was given, but stool remained positive. After an interval of 8 days he was given a third course, the enemas having double strength, together with stovarsol tablets by mouth. However, this too proved unsuccessful. This patient continued to have *EHs* and cysts in the faeces for all the time he was under my observation, i.e. 15 months, and had periodical relapses of his symptoms in spite of all the treatments given to him.

Case 4.—Mr. C. E., 30 years old, gave a long history of gastro-abdominal complaints and had

been treated for gastric ulcer. Radiological examination did not show any gastric lesion, but on stool examination cysts were found. He got temporary relief from emetine injections, but stools continued to remain positive. Patient was then put on E.B.I. retention enemas, and his motions became free from parasites after the second course only. After the last course he made a speedy recovery and began to put on weight.

I have treated 64 cases of amœbiasis with E.B.I. retention enemas and the results are given in the table.

TABLE

Case number	Laboratory report before treatment	Result after		REMARKS
		1st course	2nd course	
1	C +	Neg.	..	
2	C +	EH, C +	Neg.	
3	EH, C +	C +	"	
4	EH, C +	C +	"	
5	EH, C +	C +	"	
6	EH, C +	C +	"	
7	C +	Neg.	..	
8	C +	EH, C +	Neg.	
9	C +	Neg.	..	
10	C +	"	..	
11	C +	"	..	
12	C +	"	..	
13	C +	EH, C +	Neg.	
14	EH, C +	C +	"	
15	EH, C +	Neg.	..	
16	EH, C +	EH +	Neg.	
17	EH, C +	Neg.	..	
18	EH, C +	EH, C +	Neg.	
19	EH, C +	Neg.	..	
20	C +	"	..	
21	C +	"	..	
22	C +	"	..	
23	C +	"	..	
24	C +	EH, C +	C +	Cysts persisting.
25	C +	EH, C +	Neg.	
26	EH, C +	EH, C +	"	
27	C +	Neg.	..	
28	C +	"	..	Relapse after 4 months.
29	C +	EH, C +	C +	Cysts persisting.
30	C +	C +	Neg.	
31	EH, C +	EH, C +	"	
32	C +	EH, C +	"	
33	C +	EH, C +	"	
34	C +	EH, C +	"	
35	C +	Neg.	..	Relapse after 8 months.
36	C +	EH, C +	"	
37	C +	EH, C +	"	
38	C +	EH, C +	Neg.	
39	C +	EH, C +	"	
40	C +	Neg.	..	
41	C +	"	..	
42	C +	EH, C +	C +	Cysts persisting.
43	EH, C +	EH, C +	C +	

EH = *E. histolytica*.
C = Cyst.

TABLE—concl'd.

Case number	Laboratory report before treatment	Result after		REMARKS
		1st course	2nd course	
44	C +	Neg.	..	Relapse after 1 month.
45	C +	EH, C +	Neg.	
46	EH, C +	EH, C +	..	
47	C +	Neg.	..	
48	EH, C +	"	..	
49	C +	"	..	
50	C +	C +	Neg.	
51	C +	Neg.	..	
52	C +	EH, C +	Neg.	
53	EH, C +	C +	"	
54	C +	EH, C +	"	
55	EH +	Neg.	..	
56	C +	"	..	
57	C +	"	..	
58	C +	"	..	
59	EH, C +	"	..	
60	EH, C +	"	..	Had enterovioform simultaneously.
61	C +	"	..	
62	C +	"	..	
63	C +	"	..	
64	EH, C +	C +	C +	Cysts persisting.

EH = *Entamoeba histolytica*.C = Cyst of *Entamoeba histolytica*.

Many of these cases had previously been treated unsuccessfully by other methods. Forty-four patients were passing cysts, and 20, cysts and EHs prior to treatment. Of the 44 cyst-carriers, 31 (70.4 per cent) became negative after one course; 2 (4.5 per cent) required two courses, and 11 (25 per cent) showed in their stool after the first course not only cysts but also EHs. These 11 cases received a second course and at the end of the second course only 2 patients were still passing cysts. So that after two courses the treatment was successful in 42 (95.5 per cent) cases of cyst-carriers and failed in 2 (4.5 per cent). Amongst those patients who had become negative there were 3 cases of relapse after 1, 4 and 8 months respectively. However, it is difficult to say whether these cases were real relapses or fresh infections.

Twenty patients had on first examination EHs and cysts, and were treated with retention enemas. Of these cases, 5 (25 per cent) were cured after one course, 13 (65 per cent) were cured after two courses, and 2 (10 per cent) were still passing cysts after two courses. If the 11 cases of the first group who were passing EHs after the first course are added to those with amœbæ, then there are 4 (12.9 per cent) out of 31 patients with amœbæ who were not cured after two courses. Sixty-four cases of amœbiasis were treated with E.B.I. retention enemas. Four cases (6.3 per cent) did not respond to the treatment. Three patients (4.6 per cent) had a

relapse. All these cases had their stools examined for at least 2 months, and have been under observation for over 10 months.

This method of treatment has none of the unpleasant effects of E.B.I. when given by mouth. In the majority of the cases it causes neither discomfort nor pain. During the first 3 or 4 days there is, though not as a rule, an increased elimination of mucus and in a very few cases even of blood with the stools. These cases had also 3 to 5 motions daily. The mucus and the occasional blood in the stool might be regarded as a worsening of the condition, but it could also be viewed as a 'flare-up' of a chronic process. This would be useful for the treatment, because an acute process is less difficult to treat than a chronic one. I have the impression that due to the action of the enema the superficial epithelial layer of the intestinal mucosa may have been removed, and thus deeper-seated nests of the amœbæ may have been laid bare and brought to the surface of the intestinal lumen. This seems indicated by the number of cyst-carriers who after the first course passed not only cysts but also EHs with their stool. Except a few very resistant cases, all these patients were cured after the second course of E.B.I. retention enemas.

The treatment described in this paper has the following advantages:—

1. It can be given in the surgery or out-patient department.
2. It does not require any rest in bed or hospitalization if the latter should not be necessitated by the general state of health of the affected.
3. It causes little or no discomfort, and while undergoing treatment, the patient can attend to his work and fulfil his duties.
4. It is very economical as it requires a minimum amount of rather inexpensive drugs.

Summary and conclusions

Amœbiasis is an infection which is localized mainly in the colon and in the rectum. Therefore, local treatment by topical application of medicines is indicated. Treatment by means of small retention enemas containing E.B.I. is suggested. The results of 64 cases treated with this method are reported.

SEROLOGICAL TECHNIQUE (contd.)

By S. D. S. GREVAL

LIEUTENANT-COLONEL, late I.M.S.

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The Serum

The unknown serum.—Colour, turbidity, presence or absence of particles and state of preservation are noted. As much as possible is transferred to a sterile phial capable of holding 10 c.c. The phial is corked and on the top of

the cork is written in ink name, number or other distinguishing mark of the patient. The corked phial is inverted into melted paraffin well beyond the mouth of the phial. The paraffin seals the corked phial, prevents evaporation, makes the cork firm and preserves the writing. The sealed phials are put on a tray and immersed up to the neck in a water bath at 55 to 56°C. for half an hour for inactivation of the natural complement.

After inactivation the phials are arranged along a rack holding empty sterile test-tubes for dilution. The tubes are written upon with a glass marking pencil (yellow recommended) in accordance with the bottles. 2 c.c. of saline are put into all tubes. With sterile 1 c.c. graduated pipettes 0.5 c.c. of serum is transferred from each phial to its tube. The serum is now diluted 1 in 5. If a serum becomes turbid on dilution T is put on the dilution tube in blue pencil. For sera that are opalescent before dilution Op is put on the dilution tube. The pipettes are left in the tubes. The phials are recorked and stored in the cold.

From the dilution tubes 0.25 c.c. of the 1 in 5 sera is distributed into a column of 5 tubes. On all the tubes of the column are written the name, etc., with a glass marking pencil and the colour of the diluted serum (Op = opalescent serum; T = serum turning turbid on dilution; B = brown; R = red; P = pink; Y = yellow; C = colour nondescript). Opalescent sera and sera turning turbid may give false reactions due to their unstable colloid state. Yellow sera may also give a false positive reaction due to jaundice (and liver disease). The colour may appear like a trace of hæmolysis (T) in a positive reaction. The colour noted at this stage is going to decrease on the addition of 3 more volumes of fluid to the tube. For this reason the marked tubes are inspected again immediately before adding the rbc suspension. Any colour still present needs a special colour control: serum dilution 1 vol. + antigen 1 vol. + saline 1 vol. + rbc suspension 1 vol., to be incubated and treated like other tubes.

The serum is put in the tubes at this stage although it is shown as a part of the change in the full plan, later.

The known negative serum.—When the number of the unknown sera to be tested exceeds 24 or so this control is not necessary. Negative sera will stand out as such.

The known positive serum.—Serum pooled from about 25 cases of untreated florid secondary syphilis, diluted 1 in 10 with 2.5 per cent phenolized saline for preservation and filtered through Seitz filter gives full and partial fixation of complement on further dilution. After standing in the cold for about a month the titre of the reaction falls but remains constant for months (until the stock is exhausted). The following is a typical reaction with antigen 1 or antigen 3.

The 1 in 50 and 1 in 100 dilutions of the serum giving constant reactions are the *titrated*

	REACTION WITH	
	3 MHD of complement	5 MHD of complement
(1) Freshly pooled serum :		
1 in 50 ..	+	+
1 in 100 ..	+	+/-
1 in 200 ..	T/±	±/-
(2) After a month :		
1 in 50 ..	+	+/-
1 in 100 ..	T	T/±
1 in 200 ..	±/-	-

positive controls. Their margin of variation is small. The end point of complete fixation is indicated either with 3 or 5 MHD. When it is just indicated with 3 MHD the fixation is optimal. When it is plainly indicated with 3 MHD it is rather on the low side. When it is indicated with 5 MHD only the fixation is rather on the high side. When it is not indicated at all the fixation is too high: all negative reactions in the test will be accepted but all doubtful (T/±) and positive (+) reactions will be repeated. Conversely, when full fixation is not found even with 3 MHD the fixation is too low: all positive reactions will be accepted but all doubtful and negative reactions will be repeated.

The author pointed out many years ago that without the titrated controls the daily variations in the complement fixation were large enough to invalidate all ± and some + or - reactions. The ordinary positive control obtained from serum tested yesterday is not indicative at all of the reactions to-day, for the simple reason that it is being put up in a 1 in 5 dilution, while it may be positive in a 1 in 200 dilution.

The various adjustments in the antigen-complement system have been worked out with the aid of the titrated positive controls in the author's laboratory. They have stood the test of time.

Charging of tubes for serum.—For each serum 5 tubes are used in a column and charged as follows:—

A column.

For a serum dilution, 1 in 5, 1 vol. in all tubes (see sketch on page 385. There is a column for every serum under test in addition to 2 columns for the titrated controls).

5th row tube.	{ Complement in 1 vol. of dilution, 4 MHD (for + + +, standard) Antigen 2.
4th row tube.	{ Complement in 1 vol. of dilution, 5 MHD (for + +, standard) Antigen 1 or 3.
3rd row tube.	{ Complement in 1 vol. of dilution, 3 MHD (for +, standard) Antigen 1 or 3.

2nd row tube.	{ Complement in 1 vol. of dilution, 2 MHD (for +, additional) Antigen 4.
1st row tube.	{ Complement in 1 vol. of dilution, 2 MHD (for serum control) Saline 1 vol. (no antigen).

Antigen and complement are mixed and delivered as a double volume.

Left at room temperature $\frac{1}{2}$ hour and in the incubator at 37°C. for $\frac{1}{2}$ hour.

Sensitized rbc suspension 1 vol. added to all tubes.

Incubated $\frac{1}{2}$ hour.

A column for titrated controls for serum.

Dilution 1 in 50 or 1 in 100, 1 vol. in all tubes. (Two such columns, one for each dilution, are put up.)

4th row tube { Complement 5 MHD Antigen 1 or 3

3rd row tube { Complement 3 MHD Antigen 1 or 3

2nd row tube { Complement 2 MHD Antigen 4

1st row tube { Complement 2 MHD Saline (no antigen)

The serum control 1 in 50 should not be anti-complementary.

Typically the reactions should be :—

1 in 50 serum.	{ +/± with antigen 4 and 2 MHD. Usually ± with old fluid. 1 or 3 and 3 MHD. 1 or 3 and 5 MHD.
1 in 100 serum.	{ ±/- with antigen 4 and 2 MHD. 1 or 3 and 3 MHD. 1 or 3 and 5 MHD.

Controls of other reagents.—One set of controls for all other reagents used on the day of work is also prepared as shown below :—

A. For sensitized rbc.

Suspension 1 vol. + saline 3 vol.

B. For complement.

Comp. 1 MHD + saline 2 vol.

C. For antigen no. 1 or 3.

Comp. 2 MHD + ant. 1 vol. + saline 1 vol.

D. For antigen no. 4.

Comp. 1 MHD + ant. 1 vol. + saline 1 vol.

A is kept in the cold until the others have been incubated like the test and the sensitized rbc suspension has been added to them. Finally all are incubated and treated like the test.

Examination of the controls.—This is undertaken before the results of the test are read and in this order: (1) The sensitized rbc control. It should not show even a trace of hæmolysis. (2) The complement controls. The MHD of complement alone and in the presence of antigens should not show any appreciable deterioration. The hæmolysis should be complete in B, C and D. (3) The titrated controls. The serum dilution should not be anticomplementary. 1 in 50 dilution should fix 3 MHD completely. 1 in 100 dilution should not fix 5 MHD completely.

Reading of results for serum.—1. Immediately.

- A. Almost crystal clear and ruby red tubes = —
- B. Tubes falling short of A = ? — Provisional.
- C. Tubes only partly hæmolysed, obviously coloured supernatant fluid on an obvious and red deposit = ±
- D. Tubes apparently not hæmolysed at all = + Provisional.

In B it should be noted if all the tubes other than the serum controls are equally hazy. Some sera produce such equal haziness with the antigen without interfering with the hæmolysis. They are read as Ant(igen) Turb(idity) provisionally.

The racks are transferred to the ice chest for the night for the correct appraisal of B and D.

2. Next morning.

- B. Showing no deposit with a lens or the merest trace of colourless deposit = —
- B. " coloured deposit with a lens = ? —
- D. " no trace of hæmolysis = +
- D. " trace of hæmolysis = T
- D. " considerable hæmolysis = ±

Record and report for serum.—For the record the tubes are again treated as if running in a row from left to right (see TABLE OF WR RESULTS).

A marked difference between reactions of antigens

In the last two reactions of the table, XX and XXI, the doubtful or positive reaction is looked upon with suspicion and a search made for a non-specific cause (*vide infra*). A repetition of the test may be necessary.

It will be observed that a difference of the opposite kind has been ignored in reaction XVIII and just recognized in reaction XVII.

Explanation concerning anticomplementary sera

Certain sera like certain antigens render complement inert. They are anticomplementary. They usually acquire this property on keeping, but some sera are anticomplementary to begin with. A low anticomplementary titre of a serum can be made to disappear by heating at 55 to 56°C. for half an hour. This is accomplished at the time when the serum is inactivated.

Generally fresh normal human serum is not anticomplementary but *procomplementary* or neutral in its reaction with the complement.

When a serum has been found to be anticomplementary and another specimen is asked for, it is presumed that the original specimen had become anticomplementary on keeping.

It is not always possible to report on an anticomplementary serum. Sach's process of removing the anticomplementary substance may be tried (Process: Add 8.2 vols. of N/300 hydrochloric acid to 1 vol. of heated serum, leave $\frac{1}{2}$ hour and centrifuge to remove precipitate. Neutralization is not necessary as the acid is fixed in the precipitate of globulin.

TABLE OF WR RESULTS

	Tubes of row :—					Result (Tube in row 2 does not count if corroborative).	Report
	1	2	3	4	5		
I	—	—	—	—	—	—	Negative.
II	+	+	+	+	+	Ant. comp. Repeated 1 in 10 for III and IV.	Nil. May react as in 1 in 10.
III	±	±	±	—	—	—	Negative.
IV	T	+	+	+	+ / T	+	Positive. Degree not known. May be repeated in 1 in 10.
V	T	+	+	+ / T / ±	—	Ant. comp.	Anticomplementary. Repeat specimen.
VI	—	+	+	+	+	+++	Positive, strongly.
VII	—	+	+	+	T	++T	
VIII	—	+	+	+	—	++	Positive.
IX	—	+	+	T	—	+T	
X	—	+	+	±	—	+±	Positive, weakly.
XI	—	+	+	—	—	+	
XII	—	+ / T	T	T	—	TT	Doubtful. These reactions are not 9/10-5/10 positive.
XIII	—	+ / T / ±	T	±	—	T±	
XIV	—	+ / T / ±	±	±	—	±	
XV	—	+ / T / ±	±	—	—	±	Doubtful. Repeated before reporting.
XVI	—	T / ±	? —	—	—	±	
XVII	—	+	—	—	—	±	Doubtful: (i) significant with history, (ii) not significant without history.
XVIII	—	T / ±	—	—	—	—	
XIX	—	—	—	—	—	—	Negative.
XX	—	—	T / ±	±	—	±	Doubtful.
XXI	—	—	+	+ / ± / —	—	+	Positive or positive, weakly. Repeated before reporting. TT is the usual highest reading in tubes 3 and 4 when tube 2 is —.
XXII	—	—	? —	—	—	—	Negative.

Add 0.8 vol. saline to obtain a 1 in 10 dilution of the serum).

In combination III as long as all ± hæmolyses (or inhibition of hæmolysis) are of the same order there is no danger of missing a doubtful reaction.

Anticomplementary titre is reduced more rapidly than the positive titre, on dilution. When a typical positive reaction is obtained with a 1 in 10 dilution of the serum the positive titre is really higher than the one recorded.

Explanation concerning planning of symbols in records

Should 3 consecutive records or 3 different grades of positiveness be written, in columns

as +++ or +++
 ++ ++
 + +

As the tubes are charged for giving rising reactions from left to right and are read from left to right, the record should also be from left to right, unlike an arithmetical sum.

It will be observed that although there are 22 different combinations for record the report only gives 6 findings: (1) positive, strongly, (2) positive, (3) positive, weakly, (4) positive, degree unknown, (5) doubtful, (6) negative. From the records, however, the repeated reaction of a patient's serum under or after treatment, or with the mere passage of time, can be easily compared.

A MEDICAL MISADVENTURE—DEATH FROM STERNAL PUNCTURE

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Introduction

DEATH from any cause is regrettable, and that from a preventable one more so. That a simple procedure like sternal puncture may be attended with fatality is very disturbing and calls for a full analysis when this occurs. This paper describes two cases in whom this happened and also suggests an explanation of the mechanism involved in causing the deaths.

Case records

The first case occurred at a military hospital in 1945. On a preliminary examination a diagnosis of kala-azar was made, and as the spleen was only slightly enlarged, it was decided to perform a sternal puncture to confirm the diagnosis. The doctor attempting the puncture was experienced in the procedure, and he was a competent general physician conversant with the problems involved. After novocain infiltration of the soft tissues and the periosteum, a Bole Brothers make of sternal puncture needle was suitably guarded to expose 8 mm. of the pricking end. It may be mentioned here that this needle is guarded by a screw-guard which cannot slip. It was considered at the time, and proved afterwards at autopsy, that the needle as guarded could not pierce the posterior plate of the sternum, under ordinary circumstances; the guard being of the type that cannot slip, the needle could not go beyond the pre-determined length. And yet when the needle was pushed in, there was a gasp from the patient who rapidly became shocked, and died within three minutes. Anti-shock measures were adopted without avail though it was not realized at the time that death had occurred from anything but a severe sudden shock; the clinical picture resembled that of pulmonary embolism with which many are familiar.

At autopsy it was found that the posterior plate of sternum had the minutest puncture through which the tip of the needle could just be protruded. Opposite this puncture hole, there was a laceration $\frac{3}{4}$ inch long in the anterior wall of the right ventricle. There was hæmopericardium and death had occurred from pressure on the heart, preventing further action of the organ. With the cadaver lying supine, the end of the needle introduced through the original route could not be made to touch the heart. The autopsy was performed within an hour of death. The other relevant findings were those of an early stage of kala-azar, the parasite being seen in smears taken from the spleen and the serum giving a positive reaction to Chopra's antimony test. Death was decided

to have been due to a traumatic rupture of the heart from the sternal puncture, though a certain amount of uneasiness was felt in view of the fact that it was assumed that the needle could not have touched the heart.

The second case died under similar circumstances in a civil hospital in 1946. The order of events was approximately the same as in the first case. The needle was guarded by a plate and there was a possibility that the guard had slipped. But this was in fact not so; the guard was placed so as to expose 11 mm. of the needle and this was a safe length for the particular patient as considered at the time and also as confirmed at autopsy. The operation was performed by a competent surgeon who, however, had not performed this operation before. Novocain infiltration was used and no sooner had the needle been pushed into the sternum than the patient gasped and became shocked. Death took place in not less than two minutes, perhaps after four minutes. The surgeon had an opportunity of discussing the first case some time ago, and rupture of the heart was at once thought of. The autopsy revealed a laceration $\frac{7}{8}$ inch long in the right ventricle and a hæmopericardium. The other findings were normal except for an aortic incompetence. The operation had been undertaken to study the bone-marrow for anæmia.

In both cases the laceration was larger on the pericardial aspect than on the endocardial, and the measurements are of the pericardial aspect.

Discussion

That two deaths should have occurred in the course of a rather simple surgical procedure and the absence of a satisfactory explanation for these was rather tantalizing. The matter was discussed with several people who were used to the procedure and the best criticism that could be offered was that there was an error in fixing the guards; but this was in fact not so. Even if it was, the happenings would not have been fully explained, for it is known that a puncture of a muscular organ is easily sealed off immediately after the needle is removed; intracardiac injections are not attended with hæmorrhage into the pericardial sac.

A review of the cases made several facts stand out. Firstly, the needle had punctured the posterior plate of the sternum, though to a very minute degree only, in each case. Secondly, as no premedication was used, the patients were rather apprehensive and probably held their breath. Thirdly, death was in each case due to arrest of the heart from continued hæmorrhage into the pericardial sac. Fourthly, the laceration involved the right ventricle and was nearly an inch long. Fifthly, the needle could not have touched the heart under ordinary circumstances. Sixthly and finally, there was no other cause of death found.

The heart is a very muscular organ, constantly stretching and contracting in diastole and systole respectively. That the tension in the heart is increased by holding the breath is an accepted fact of physiology. Holding of the breath causes an increased carbon-dioxide tension in the venous blood and this increased CO_2 tension enhances the extensibility of the cardiac muscle fibre during diastole. A person can by holding his breath, therefore, make his heart a little larger than normal, and a larger heart will tend to come nearer the sternum. This heart will be more stretched than normal. It is easy to visualize how an apprehensive person will, by holding his breath, bring the heart nearer to the posterior surface of the sternum and thus make it more susceptible to possible trauma from even a minute portion of the sternal puncture needle. It is also easy to see that while a contracted heart may throw off a needle, a relaxed heart may not be able to do so; in fact in a relaxed muscle a small prick will be rapidly converted into a tear if behind the relaxed muscle there is some other force. In diastole of the heart while the muscle is relaxed, there is a constantly rising pressure within the heart. Here then were the circumstances that could explain the two deaths. The apprehensive patient holds his breath, renders the heart slightly larger in size and more extensible, brings it nearer the sternum, where it is touched off by the small unsuspected portion of the needle, the rising tension of the heart converts the minute puncture into a laceration, and hæmopericardium follows.

A series of experiments was then conducted by dropping sharp needles weighted near their business ends on to football bladders which were put under varying degrees of tension. A high tension threw off the needles; a very relaxed bladder did not offer the needle any foothold though a mark was sometimes made. A medium pressure was found to be optimal for production of a puncture. If the bladder was kept attached to the pump, and the needle was dropped when the bladder was about two-thirds stretched, a puncture was easily produced, and the pressure of the pump overcoming the elasticity of the bladder, the puncture was made into a rent. Though suggestive, the experiments did not conclusively prove anything, for the same needle similarly weighted and dropped on the bladder under the same optimal tension did not always produce the tear. It was considered necessary to discover some more cogent explanation which, by itself or in conjunction with what has been said above, would explain all the phenomena.

It has been seen that in performing a sternal puncture, the needle is often pushed in by a series of jerky movements rather than by a steady pressure. These jerky movements give rise to two other movements. Firstly, with each jerk, the sternum tends to flatten out and come in

closer contact with the heart, and secondly with each jerk the patient becomes more apprehensive, causing the man to hold his breath and thus setting in motion the mechanism described above whereby the heart is rendered more liable to trauma from the sternal puncture needle. The jerks also damage the soft tissues in front of the sternum and reduce their depth, and allow the needle to go a trifle deeper. There is, thus, an unintentional and unsuspected increase in the range of the needle.

If heavy pressure is used in forcing the needle through the cortical layer of the sternum, there will be further sterno-cardiac approximation. One jerk may not puncture the heart, for the heart may be contracted in systole, but the next very well may, when the heart may be in diastole and by force of circumstances detailed above held pressed behind the sternum with the wall relaxed but the intracardiac pressure rising.

Experiments were then made on cadavers. It was seen that with the force of the jerky movements associated with sternal puncture, the sternum could be pressed down for nearly an inch and the soft tissues could be reduced in depth for up to 4 mm. If the anterior mediastinum which is after all only a potential space is fully obliterated by the heart, and there is an unsuspected increase in the range of the needle, there is nothing to prevent a traumatic rupture of the heart.

There can be little doubt that the two deaths occurred in the above manner, the sequence of events being as follows:—

1. Apprehension caused holding of the breath and this in turn led to stretching of the heart and its approximation to the sternum.
2. Jerky movements caused an unsuspected increase in the range of the needle; they also caused more approximation of the heart to the sternum.
3. The needle, then, unsuspectingly pierced the posterior plate of the sternum and caused a small prick in the apposed heart.
4. The heart having been put on the maximal stretch both by diastole and increased CO_2 tension, the prick rapidly became converted into a laceration by the rising intracardiac pressure.
5. Hæmopericardium followed leading to mechanical arrest of the heart, and to death.

Conclusion

It will be seen that a whole set of conditions has to be fulfilled before the catastrophe can occur in the above manner. It is not unlikely that this does not happen so very often, and may explain why there are so few deaths in attempting this operation. This, if true, is indeed a fortunate coincidence seeing how very casually sternal puncture is generally under-

taken. The lessons taught, in any case, should not be ignored. They are :—

1. Apprehension in the patient should be forestalled by suitable premedication.
2. The adjustment of the needle should be checked just before the operation. In doubt it should be guarded too much rather than too little.
3. Only the minimum amount of force should be applied and that in a steady pressure, and not in jerks; in fact, great gentleness should be used.
4. The anatomy of the regions affected should be visualized before the operation, and the dangerous nature of this apparently simple procedure remembered.
5. The routine for performing the operation should be standardized and converted into a ritual, as other pre-operative measures have been. The adherence to a strictly followed routine renders mistakes easy of detection.

Summary

1. Two cases are described in which death occurred after sternal puncture.
2. Death was in both cases due to a rupture of the right ventricle following a prick by the needle, causing hæmopericardium and arrest of the heart.
3. The possible mechanism leading to the rupture is discussed and results of certain experiments made in this connection are mentioned.
4. Certain precautions are suggested to prevent such catastrophes.

Note.—The production of a laceration of the heart by the contracting heart itself rubbing against a protruding needle presupposes too much penetration by the needle, and is to be explained by carelessness, and does not form part of this paper, which merely tries to point out some hitherto unrecognized dangers of sternal puncture.

Thanks are due to Dr. S. Nagaswami, M.B., B.T.M., for records of the first case, to Major W. Merrivale, R.A.M.C., M.R.C.P., Specialist in Pathology, for the autopsy report of the same case and also for allowing conduction of certain experiments in his laboratory, and to Lopamudra Bardhan for help with preparation of the paper.

ARTHRODESIS OF SHOULDER

A CASE REPORT

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ARTHRODESIS of the shoulder from above has been performed for many years, with parts of the acromion process and the clavicle as grafts attached to the upper end of humerus. This technique ignored the fact that the shoulder tends to adduct through gravity and slight adduction may separate the graft with chances of failure of fusion. Brittain recently pointed out that it is not enough that the graft should have an adequate bed and that it is well secured but that the graft should be placed with its long

axis in compression rather than in tension. He applied the architectural principle of a lamp hanging from a wall by a bracket and supported by a stay. If the stay is an underlying one it is in compression and consequently the two ends of the stay tend to become secure, whereas if the stay is an overlying one, there is tendency of separation of the two ends of the stay due to gravity [vide figure 1 (a) and (b)].

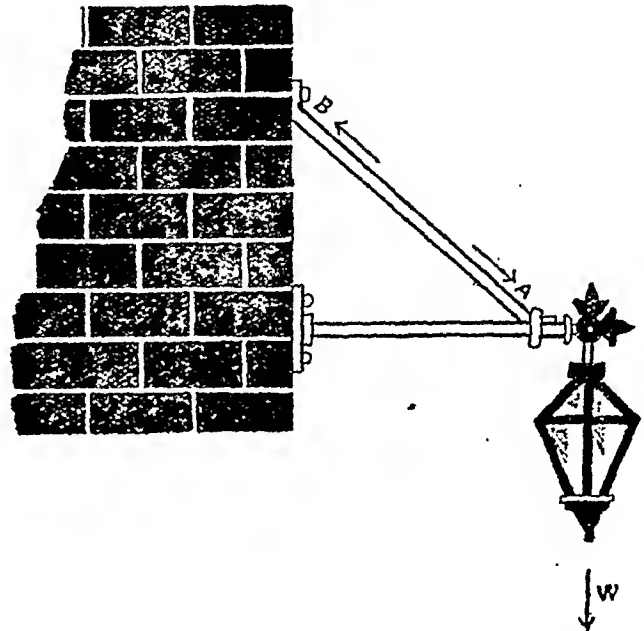


Fig. 1.—(a) Showing position of the stay under tension. Lamp hanging from a wall by a bracket and supported by an overlying stay. The stay is in tension, and there is tendency to disruption at points A and B. (After Brittain.)

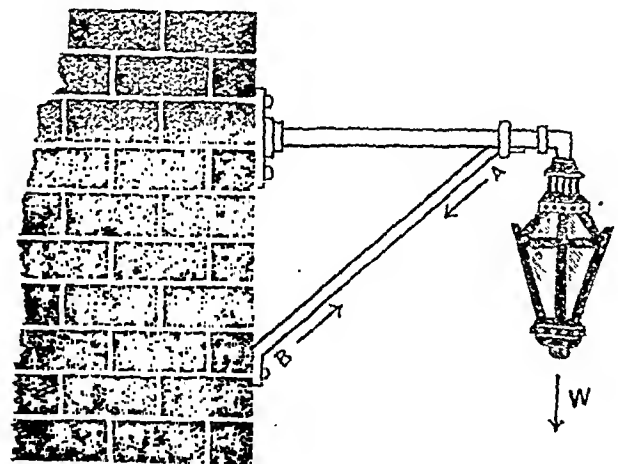


Fig. 1.—(b) Showing the position of the stay in compression. An ideal position for the bone graft. Lamp hanging from a wall by a bracket and supported by an underlying stay. The stay is in compression. Consequently points A and B are tending to become more secure. (After Brittain.)

In other words if the graft is placed below the scapulo-humeral joint, there is every possibility of the graft taking, thus leading to a sound arthrodesis.

The following case will illustrate the result of such a technique.

Case record

Ramu, driver, aged 24, Hindu male, met with a lorry accident on 5th January, 1946, and sustained fracture dislocation of right shoulder joint. On 15th February, 1946, the deltoid was found markedly wasted and flaccid with prominence of the bony landmarks. Head of the humerus could be felt in the axilla and there was a small area of sensory loss over the outer side of arm. Marked limitation of shoulder joint, especially abduction. X-ray showed the fracture line through the anatomical neck of the humerus and the head lying below the glenoid cavity.

On 20th June, 1946, extra-articular arthrodesis of shoulder joint was performed with a graft taken from tibia (*vide* figure 2, plate XVI). The shoulder was approached from the posterior aspect and a massive tibial graft was inserted into the humerus and the axillary border of the scapula below the shoulder joint.

The graft was cut with an osteotome and Brittain's technique was followed. The result is very gratifying as may be seen from the photographs [*vide* figure 3 (a), (b), (c), (d) and (e), plate XVI].

Comment

When the case was first seen by the author it was more than five weeks old. At that time traction and manipulation would probably have failed to reduce the dislocation. Open reduction was thought of, but one doubted its result because of the possibility of avascular necrosis of head and further operative procedure disturbing the remaining vascular supply of the head. Moreover, the patient had right axillary nerve palsy. Arthrodesis was considered as the proper line of treatment at that stage. This judgment was also based on considerations of the occupation and the age of the patient.

My thanks to Major E. H. Lossing, M.D., I.M.S., for allowing me to report this case which was also demonstrated in a clinical meeting at the School of Tropical Medicine, Calcutta.

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TREATMENT OF MAJOR BURNS IN 1940 AND 1946

COMPARISON OF TANNIC ACID TREATMENT WITH COMPRESSION BANDAGE METHOD

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AN attempt is made in this article to compare the results of general and local treatment of

major (Wallace, 1941) burns in the above-mentioned years. By major burn is meant any burn that covers more than 1 per cent of the body surface or that covers any joint surface or that is too near any source of natural contamination, e.g. mouth, anus, etc. In 1940, shock was treated by ordinary normal saline or gum saline and the burnt areas were tanned by tannic acid in 1 in 1,000 acriflavine. In 1946, one had the good fortune of treating shock with serum and the burnt areas by compression dressing using sulfathiazole and vaseline gauze. The infections could be prevented or combated by penicillin in 1946 over and above the sulfa group of drugs of 1940 and of later years.

If one traces the history of local treatment of burnt areas, one comes across a great many ointments and tanning reagents. Starting from picric acid, cod-liver oil, one passes through 1925 when Davidson (Lee and Rhoads, 1944) introduced tannic acid to precipitate the denatured protein and thus to prevent absorption of burn-toxin as that was the accepted theory at the time. He claimed that tannic acid stopped fluid loss too. Tannic acid held the field in treatment of burns for nearly 20 years. Tannic acid brought the mortality rate down from 26.7 to 10.5 per cent in Harkins (Riehl, 1942) series of cases. The tannic acid treatment has been losing its reputation rather quickly. It has been suggested by Erb, Morgan and Farmer (1943) that tannic acid causes liver damage after absorption from the burnt area especially when a big surface is involved. Tannic acid is also toxic to epithelial cells. Pus spreads under the crust spreading infection from 3rd degree areas to 2nd degree areas. Mild infections under the crust destroy a number of epithelial islets especially in deeper 2nd degree burns. The crust is uncomfortable to the patient and takes a long time to separate. In 3rd degree burns which are almost always infected, the crust with the pus underneath it will only delay healing processes (McIndoe, 1940).

The method of surgical cleanliness, compression bandage using some antiseptic ointment and rest, is advocated by many in America (Koch, 1944). A simple method of the above principle was followed in the series of cases treated in 1946 in the Campbell Hospital and is described below in detail.

Procedure.—As soon as a burn case came to the out-patient department, the officer on duty quickly examined the case. To a case of major burn, he gave a proper dose of morphia, covered him up with a clean sheet and blanket and sent him to the in-door ward. In the wards the dirty clothes were taken off and the patient was put on a sterile sheet. A sterile sheet covered him and then the blankets, electric cradle, etc., were used according to the necessity. In the cases with less than 10 per cent of the body surface burnt, the electric cradle was not needed except in winter. Then the patient was treated for shock

with serum or saline when serum was not available. (In this respect one is sorry to remark about the scarcity of serum since the war has stopped, most probably due to decreased number of donors visiting blood banks these days.) Adrenal cortex was used in some severe cases without any convincing result.

As soon as the patient recovered from shock or if he had a mild shock, attention was paid to the local treatment. In the earlier part of the series, general anaesthesia used specially in patients who recovered from moderate or severe shock proved definitely harmful. Two cases with less than 20 per cent burns died of shock within a few hours after cleaning was done under general anaesthesia (open ether was used) though they recovered from shock before the operation. So in the latter part of the series general anaesthesia was not used in such cases. Cases with less than 10 per cent area burnt did not affect the result whether general anaesthesia was used or not. Still in most cases attempt was made to tackle the case without anaesthesia and with administration of morphia only.

Cleaning.—Cleaning was done in the operation theatre with rigid aseptic technique, i.e. with masks on, etc. The blisters were snipped off. The parts were washed with sterile normal saline and cotton-wool swabs. Utmost gentleness was practised in the matter of washing; no rubbing but only dabbing was done, the note of warning being complaints of pain by the patient. In fact if this procedure is carried out carefully and gently, the patients are not disturbed from the soothing effects of a proper dose of morphia ($\frac{1}{4}$ to $\frac{1}{2}$ gr. for adult). Sulfathiazole powder was sprinkled uniformly over the cleaned areas with a gauze puff containing the powder. Total amount of the powder to be used was restricted to 8 to 12 grammes and this was sufficient in all cases. Then two layers of wide-meshed vaseline gauze were placed over the parts. Six to eight layers of gauze and $\frac{1}{4}$ inch thick layer of cotton-wool were used to cover the parts. The bandage was applied fairly tightly except in cases of chest wall. In the limbs the bandage was applied from the ends if the burnt area was near the wrist or ankle. The parts were watched carefully so that the tightness might not reach the stage of occlusion of vascular supply. The parts were kept at rest using splints for the limbs, elevating the limbs whenever much swollen.

Treatment of shock was continued or repeated in bad cases as necessity arose. Systemic administration of sulfathiazole or penicillin was started as a routine from the 2nd day and continued for the first seven days or for three days after there was no fever. If in any case the temperature persisted after seven days, a gap of three days was given before starting the next course of sulfathiazole. Usually these cases were followed by penicillin with very encouraging results.

Systemic medication to combat infection in cases of burns with 10 to 30 p.c. of body area burnt

	Total number of cases	Number of cases who were cured	Number of cases who died of infection
Penicillin ..	11	10	1
Sulfathiazole ..	18	15	3

It is obvious from the above figures that penicillin was much more effective in preventing and curing infections of burnt areas. It should be the drug of choice in all cases.

The first dressing was changed after 7 to 10 days. In all cases of 1st degree and superficial second degree burns the wounds healed up within this period. Patients were discharged cured in 10 to 14 days. The areas that were not dry or epithelialized were treated again with sulfathiazoles and vaseline gauze kept for another week. Quite a number of cases healed up in another one or two dressings, i.e. within 21 days. The remaining cases needed a skin graft and the same was done as soon as the area showed healthy granulation tissue. Skin grafting was necessary in all 3rd degree burns. The 2nd degree burns never produced secondary degeneration of epithelial islets so as to require skin grafting. Skin grafting was possible much earlier in this series of cases than was possible in cases treated with tannic acid. Complications like broncho-pneumonia, pyæmia, septicæmia have nearly become unknown with this method of treatment. In 1946 series there was only one case of broncho-pneumonia amongst 91 cases, whereas in 1940 there were 5 cases in a series of 80. The following are the tables for comparative study in the two years with two different methods of treatment (see tables I and II).

It will be seen that the death rate in 1946 was nearly half of that in 1940 taking all cases. When the cases with more than half the body surface burnt are excluded, then the death rate in 1946 is almost a third of that in 1940. Of the four cases of death due to infection in 1946, penicillin could not be provided for 3 cases as it was out of stock and out of market at the time (March-April 1946). Only one case died of infection even when penicillin was given parenterally.

Death between 3 and 5 days due to so-called acute toxæmia of burns is getting unknown these days.

In table II the number of cases getting severe infection is more than double in 1940 as compared to those in 1946. In 1946 penicillin was used only in 12 serious cases of whom only 2 developed severe infection. One can hope that when penicillin will be used for all cases both locally and parenterally, severe infection of burnt areas will become a thing of the past.

As the incidence of infection was much more frequent in 1940, so the average stay was much longer and this is corroborated by actual calculation.

Average stay in 1940 = 24.2 days (59 patients staying for 1,431 days).

Average stay in 1946 = 13.7 days (77 patients staying for 1,056 days).

routine measure in cases with more than 10 per cent area burnt.

6. The simple procedure of compression dressing described in the article is recommended for all cases of burns.

In conclusion, I am thankful to Major E. H. Lossing, i.m.s., Superintendent, Campbell Medical School and Hospital, to the resident medical officers of the surgical

TABLE I
Mortality

Year	Total number of patients treated	Number of deaths due to shock, i.e. within 48 hours	Number of deaths due to infection	Percentage of deaths due to shock	Percentage of deaths due to infection	Total percentage of deaths
1940	80	11	10	13.5	12.5	26
1946	91	9	4	9.5	4.5	14

If burns of more than half of the body surface which have so far been held to be hopeless cases are left aside the statistics are as follows :—

1940	75	6	10	8.0	13.3	21.3
1946	85	3	4	3.6	4.8	8.4

TABLE II
Infection

Year	Total number of patients living after 48 hours	NO FEVER OR INFECTION		FEVER FOR A WEEK WITH LOW GRADE INFECTION CAUSING NO DELAY IN HEALING		HIGH FEVER WITH SEVERE INFECTION	
		Number	Percentage	Number	Percentage	Number	Percentage
1940	69	23	33.3	21	30.4	25	36.3
1946	82	52	63.4	18	21.9	12	14.7

Summary

1. In 1940, 80 burn cases were treated with saline for shock and tannic acid for local areas with a mortality rate of 13.5 per cent from shock and 12.5 per cent from infection.

2. In 1946, 91 burn cases were treated with serum for shock and compression dressing with sulfathiazole and vaseline gauze for local area with a mortality rate of 9.5 per cent from shock and 4.5 per cent from infection.

3. Excluding cases, with more than 50 per cent area burnt, the mortality rate (8.4 per cent) and the incidence of severe infection (14.7 per cent) in 1946 have been brought down to nearly one-third of those in 1940 (mortality rate 21.3 per cent, incidence of infection 36.3 per cent).

4. In 1946, average stay of a patient in hospital (13.7 days) is decreased to almost half of that in 1940 (24.2 days).

5. Penicillin is the best drug for combating infection to burn cases, only one case died of infection when penicillin was being given as

wards and to the Chief Registrar for their kind collaboration.

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EXPERIENCES OF RIOT SURGERY

A REVIEW OF 50 CASES

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THIS paper is an attempt at evaluating the results of established methods of treatment and new techniques of management of some 50 casualties resulting from the recent communal riots in Calcutta.

The casualties could be divided into the following categories :—

1. Abdominal stabs and gunshot wounds 12.
2. Stab wounds of the thorax 15.
3. Stab wounds involving soft tissue only 13.
4. Gunshot wounds of the extremities including compound fractures 10.

Abdominal stabs and gunshot wounds

These take the pride of place not only because of their frequency in this riot but also because they need the greatest attention and have the highest mortality.

Every case of abdominal stab or gunshot wound requires exploration however trivial the superficial wound may appear to be. This fact is well recognized and requires no emphasis, were it not for the fact that the extremely minor nature of the parietal wound often deludes the surgeon.

Example.—A small boy was admitted with a stab wound in the left lumbar region just below the costal arch. The wound was minute, and the child was in good condition with a slow pulse rate. The abdomen was soft. There was little tenderness, there was no fluid in the peritoneal cavity and peristalsis was active. The child had passed clear urine. The child was watched for 24 hours. On the second day his condition worsened and he complained of pain and increased tenderness in the left renal angle. Laparotomy disclosed subcapsular hæmatoma of the spleen. Splenectomy was performed.

The site and direction of the stab wound is a good indication of the structures likely to have been injured. A good illustration of this was in the man who was struck obliquely in the right loin and sustained laceration of the right lobe of the liver, perforation of the pyloric end of the stomach, first part of the duodenum and the adjoining portion of the transverse colon.

Gunshot wounds of the abdomen, however, have precarious pathways and often-times surprise the most painstaking surgeon.

When to operate.—It is a mistake to operate on any case of stab wound of the abdomen until the patient has been well resuscitated. I have heard it being expressed that if you cannot operate on these cases within the first 3 hours, the prognosis is almost hopeless. I have also noted the opinion of surgeons who say that shock for some reasons is conspicuously absent in these cases in the first few hours (Som and Mukherjee,

1947). In my experience this is a dangerous teaching. I find that shock in these cases is most profound within the first 2 to 3 hours and that unless the patient is in a reasonable condition to withstand what may be a major operation, it is a mistake to operate on them straightaway. The exception of course is in those cases where hæmorrhage is suspected. My practice is to insist on a well-regimented course of resuscitation and not to operate on any case until the systolic pressure has risen up to 100 mm. and diastolic to 60 mm. Hg.

Incision.—Routine use of paramedian incision is to be deprecated. There is a good deal to be said for the use of oblique and transverse incisions in selected cases. Exposure is much improved. Manipulation is easier, the general peritoneal cavity can often be left undisturbed and closure of the abdomen is less difficult.

Example.—A man received a stab wound of the right flank, the direction being downwards and inwards. The abdomen was opened by a transverse muscle cutting incision. It revealed lacerated injury of the right lobe of the liver and hepatic flexure of colon. Repair was easy. Two points need be stressed (1) that the general exploration of the abdomen, if necessary, can be well accomplished by the incision, and (2) that the resulting scar is quite sound.

If the wound of entry is somewhere in the back posterior to the mid-axillary line, it is a good practice to attend to this first and afterwards turn the patient on his back and proceed with the abdominal exploration. The advantages of this procedure are that (1) it causes less shock and that (2) surgeons are otherwise liable to forget about posterior wounds at the end of an exhaustive abdominal operation.

Another sound procedure and one which occasionally saves much unnecessary work and time is to investigate all the abdominal structures carefully and make a survey of all the lesions first before commencing actual repair. Very often multiple lesions are present in nearby segments of the bowel and after a time-consuming repair of a perforation, the surgeon is faced with a non-viable nearby segment when both could be included in a single resection anastomosis. Similarly injuries to solid viscera sometimes escape notice when they are associated with hollow visceral injuries. My own practice is to examine the solid viscera first after opening the abdomen, to pack any sources of bleeding found and then to investigate the hollow viscera from stomach downwards and their mesenteries. If more than one lesion exist in the hollow viscera, I close them up temporarily with gauze cover held in place by Allis's forceps until they are taken in turn for repair. This avoids unnecessary spillage and also forms useful guide for the surgeon especially when he is in a hurry.

Dealing with the actual lesion: Small intestine.—It is generally recognized that repair

is always better than excision. Three facts need stressing :—

1. There is little danger of narrowing of the lumen and stenosis after repair. Even if the wound in the small gut involves two-thirds of the wall, repair is still to be preferred.

2. If there are two or more wounds in closely contiguous areas of small bowel, it may be feasible to join them and repair them together instead of separately (Turner, 1943).

3. Excision of the small intestine has a much higher mortality than repair.

The indications of excision of small intestine are :—

1. Crushing of the gut wall so as to make it non-viable.

2. Loss of blood supply due to considerable separation of the mesentery from the gut wall. In the present series of cases excision and anastomosis were necessary only in one case (2 per cent) and the man recovered.

Large intestine.—The advantage of exteriorization over repair and closure of the large gut lesions have been widely stressed in the last war. Over the mobile areas of the colon exteriorization is easy and less time-consuming. Over the fixed areas it may not always be possible and in such cases repair should be accompanied by local drainage and proximal colostomy.

The indications of excision in large gut lesions are practically the same as those in small intestine except that as the large gut stands exteriorization well, the need for excision arises less frequently. When it does arise however, immediate suture and anastomosis are to be deprecated as mortality from this procedure is high. The operation described by Paul Miculicz under such circumstances is a safer plan to follow.

Thoracic stab wounds

All cases of thoracic stab wounds treated during the riots have recovered. This is quite remarkable when contrasted with gunshot wounds of thorax (which were unaccountably absent in this series) in which mortality is said to be quite high. All these thoracic stab wounds were associated with extensive surgical emphysema and hæmothorax to a greater or lesser extent. Surgical shock was not a major factor, in fact its absence to any marked extent was remarkable. Only one case with open pneumothorax required resuscitation and he quickly recovered after the pneumothorax was closed. All cases of hæmothorax were aspirated as a routine, some requiring 2 to 3 aspirations. Average amount of blood aspirated was about 15 oz. Intrapleural instillation of penicillin was done at the time followed by routine parenteral penicillin.

I consider that routine use of intrapleural penicillin is a great advance in the treatment of thoracic injuries and explains much of the good results obtained.

Stab wounds involving soft tissues

These have been treated on orthodox lines and have not caused much difficulty. Primary excision or débridement followed by sulfanilamide dusting has been the usual method. I have preferred to leave the wounds open except in special areas such as the hand or the face. One remarkable case in which the right hand was literally bisected into two by a cut through the whole thickness of the palm between the middle and ring fingers and reaching up to the thenar and hypothenar muscles but somehow sparing the tendons and nerves made a perfect recovery with primary healing.

There was one case of nerve injury involving the ulnar nerve about the middle of the forearm, which was sutured about three weeks after the injury together with anterior transposition.

There were also a few cases of tendon injury involving the flexors and extensors of the fingers which were treated by secondary suture.

Gunshot wounds of the extremities including compound fractures

These have been treated on conservative lines, care being taken in the primary excision to save as many pieces of loose bones as possible. I have preferred skeletal traction to immediate plastering especially in the case of the femur. One case is worth recording. This was a man who had been shot at close quarters and had sustained an extensive lacerated wound in his right arm involving an area of five inches long with compound comminuted fracture of the humerus. The fractured area in the humerus involved its middle $\frac{1}{3}$ and there were many loose pieces of bones. There was also complete avulsion of the musculospiral nerve. Kirschner wire traction through the olecranon after primary excision of the wound caused rapid healing of the wound and after one month the arm was put in plaster according to Böhler's method. As it was impossible to suture the musculospiral nerve, tendon transplantation using the flexor tendons of the forearm was performed after six weeks and the man now has a remarkably efficient limb with a soundly united humerus and 80 per cent power of extension of the wrist joint restored.

Summary

1. This paper is based on the experiences of the recent riot casualties in Calcutta.

2. A few salient points in the management of abdominal stab and gunshot wounds have been mentioned.

3. Thoracic stab wounds have been remarkable for the absence of marked surgical shock and for rapid recovery. Routine use of penicillin is responsible for the latter.

4. Soft tissue injuries and gunshot wounds of extremities have been treated on usual lines. Skeletal traction is preferred to plaster fixation in the treatment of compound fractures.

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TRAUMATIC ARTERIAL SPASM

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Introduction

THAT the arteries undergo spasmodic contraction, when subjected to trauma or concussion violence, is now a well-recognized fact. Called by the French surgeons 'Stupeur Arterialle' and by the German surgeons 'Kroh's Arterial Spasm', the phenomenon was described by Makins (1919) towards the end of World War I. During World War II, several remarkable instances of the condition were cited from diverse theatres of war.

In a series of 567 cases of battle casualties treated in an Indian general hospital, the phenomenon was observed in twenty-seven cases or roughly in 5 per cent of the cases. Actual incidence may be higher as by the time these casualties arrived at the hospital, some of the milder forms of the arterial spasm had already subsided.

Blood vessels in which the phenomenon was noted

Axillary artery	..	..	3
Brachial artery	..	..	8
External iliac artery	..	..	1
Femoral artery	..	..	4
Popliteal artery	..	..	5
Posterior tibial artery	..	..	6
TOTAL			27

Causative factors

Gunshot wounds	..	..	15
Shell wounds	..	..	4
Bomb wounds	..	..	4
Non-missile compound fractures	..	..	2
Application of tourniquets	..	..	2
TOTAL			27

Description of the phenomenon in the present series of cases

The affected segment of the artery, together with a portion above and below it, was usually found to be empty and firmly contracted. In extreme cases, the reduction in the calibre reached as much as one-sixth of the normal circumference. The branches or collaterals arising from the affected part shared the same fate. The radial or the posterior tibial pulsation was

obliterated. The hand or the foot was pale and cold.

This phenomenon of segmentary contraction was noted more frequently in the brachial than in the axillary, more in the femoral than in the external iliac and more in the posterior tibial than in the popliteal, as will be evident from the incidences in the respective vessels as stated above. In other words, the medium and small-sized vessels of the extremities were more often affected than the large vessels at the roots of extremities. Rene Leriche observed the same incidence.

In one case of gunshot wound through the right arm, two inches above the bend of the elbow, the brachial artery was perforated. But there was no extravasated blood in the tissues outside the blood vessel. Sir George Makins observed quite a number of similar instances in World War I.

In seven cases (five gunshot wounds, one shell wound and one bomb wound) or in one-fourth of the total cases, the high-velocity projectile perforated or penetrated the tissues about $1\frac{1}{2}$ inches to $\frac{1}{2}$ inch from the main artery. There was no naked-eye structural damage of the vessel yet the latter exhibited segmental contraction. Evidently concussion violence reacted on the vessel wall. In sixteen cases, the vessel was contused, lacerated, ruptured or perforated.

Regarding the two non-missile compound fractures, the popliteal artery was contused by the jagged margins of the lower fragment of femur in one case, while in the other, the posterior tibial artery was found to have been pierced and kept tethered over a projecting spike-like process of the lower tibial fragment. Both the vessels were thrombosed at the site of injury, besides being contracted.

Regarding the two tourniquet cases, both were received from the field ambulances with notes stating that owing to uncontrollable hæmorrhages in the palm and in the calf following shell wounds, tourniquets had been applied in the lower part of the arm and thigh. Both were received within an hour of the application of the tourniquets. Apparently they had been applied very tightly, as their release left furrows $\frac{3}{4}$ inch deep in the soft tissues. Neither the release of tourniquets nor rapid infusion of plasma helped in the return of the circulation of the limb. At operation, the lower fourth of the brachial artery and lower fifth of the femoral artery were found to be extremely contracted. As soon as the vessels concerned were lifted from their beds, in the twinkling of the eye the circulation restarted.

Treatment adopted

A. For those cases where concussion violence set up the phenomenon: exposure of the artery, hot saline packing, lifting the artery from its bed or removal of surrounding areolar tissue—one of these measures or a combination of all

sufficed to re-awaken the artery from its 'stupor' and restart the circulation.

B. For those cases where structural damage initiated the phenomenon: resection of the damaged segment of the artery between ligatures made the spasmodic contraction disappear and re-established the circulation with the help of collaterals.

The following non-operative measures were suggested:—

(i) Intravenous injection of papaverin hydrochlor for vasodilatation.

(ii) Para-vertebral injection of novocaine, brachial plexus blocks or spinal anaesthesia to interrupt afferent impulses from reaching the cord.

But these measures were not given trial in the forward area, firstly for the uncertainty of the results and secondly as all wounds were to be opened up ultimately for primary wound excision or débridement.

The phenomenon as described by some of the previous observers

1. After he had exposed the posterior tibial artery of a dog, Hunter (Palmer, 1835) observed it to be 'so much contracted in a short time as almost to prevent the blood from passing through it and when divided, the blood only oozed out from the surface'.

2. A case of gunshot wound in the femoral triangle was described by Kroch (1915), in which the lower limb apparently became cut off from the circulation. At operation 'the artery was found apparently undamaged but contracted to the size of a knitting needle. When the artery was fully exposed, it suddenly dilated to normal size'.

3. Out of the experience of peri-arterial sympathectomy, Rene Leriche observed that as soon as the adventitia of an artery was touched, the artery underwent a localized contraction and became progressively reduced in calibre until it had only one-third or one-fourth of its normal volume over the entire segment that had been touched. The supra- and subjacent segments retained their normal calibre as long as the operative procedure did not concern them. 'Sometimes the simple pressure of the bistouri on the neighbouring muscles and indirectly over the common vascular sheath sufficed to fix the artery immovably in contraction'.

Discussion

The phenomenon is a reflex vasoconstriction, the afferent impulses originating in the injured segment. The proof of this statement lies in the fact that excision of the injured segment does away with spasmodic contraction.

The older physiologists did not believe in the existence of the sensory fibres of the blood vessels. Their existence is now proved. Hirsch (1926) has demonstrated, in the adventitious

coat of the peripheral vessels, encapsulated end-organs, tree-like or brush-like structure, which are terminations of autonomic afferent nerves.

The mode of distribution of autonomic fibres in the limb blood vessels will explain some aspect of the phenomenon described above. The main blood vessel of a limb is at its commencement innervated by fibres derived from the ganglionated sympathetic trunk (Kramer and Todd, 1914) in the case of the upper extremity, and from the continuation of the aortic plexus over the common iliac and external iliac vessels in the case of the lower limb (Woollard, 1926). These fibres extend only as far as the axilla or groin. Thereafter the limb vessels receive contributions from the neighbouring nerves at different levels (Hirsch, 1925), or in other words the innervation becomes more or less segmental: hence the segmentary contraction.

The number of branches joining the vessels of the extremities from the adjacent nerves is far greater and total extrinsic nerve supply is far richer than has hitherto been assumed (Kuntz, 1945). According to Burns *et al.* (1937) the proximal portion of the vascular tree is innervated with far less sympathetic fibres than the more distal portion innervated through the limb nerves. This will explain the comparative rarity of the phenomenon in the large blood vessels.

The phenomenon of contraction lasts for at least 24 hours and in some instances may continue for three or four days. Left to itself the distal pulse may then return but by that time muscles are all gangrenous.

The reflex vasospasm is undoubtedly a protective device of nature against the danger of bleeding to death after severe vascular trauma. The subject escapes from the danger of imminent death and may later on pay the price in the shape of ischaemic contracture or gangrene of the limb.

Summary

1. Traumatic arterial spasm or reflex segmentary vasospasm found in 27 cases out of a series of 567 battle casualties is described.

2. Besides direct trauma, concussion set up in the vicinity of the main vessel by the passage of high-velocity projectile or even pressure on the artery from outside are productive of the phenomenon.

3. Segmentary spasm and greater incidence in the medium and small vessels are explained on the anatomical basis of distribution of autonomic fibres to the vessels.

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SUPRAPUBIC PROSTATECTOMY WITH SPECIAL REFERENCE TO PENICILLIN TREATMENT

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SOME persons after the age of 50 years get retention of urine as a result of hypertrophy of the prostate gland. This hypertrophy of the gland may attain a considerable size even as big as one's own fist, the normal weight of the prostate being only 18 grammes. Histologically this enlargement consists of overgrowth of the glandular tissue in the form of multiple adenomata, in some cases cystic changes are also observed and occasionally a few fibromyomata are also seen. Malignant disease may supervene in about 10 per cent of the cases. The enlargement of the gland may be hard or soft and in the latter case extremely vascular. Even in early stages of the enlargement it is liable to sudden attacks of congestion and in the early stages this congestion can be relieved by medical treatment but later on hypertrophy of the gland reaches to such an extent that medical treatment proves of no avail. The general health of the patient is slowly undermined due to the constant irritation, frequency of micturition, want of sleep and gradual toxic absorption.

In early stages these patients usually take to catheter life and seek admission to the hospital only when there is complete retention of urine and/or catheterization becomes difficult due to inflammation of the posterior and prostatic urethra.

In the series of cases noted below who came under the treatment of the writer mostly from the rural side of the Rohilkhand Division, U.P., during the last two years the following line of treatment was adopted with successful results. Special attention was paid to avoidance of urethral instrumentation as far as possible as most of the patients had already undergone frequent catheterization before coming to the hospital, in some cases there being false passages and almost all had some degree of cystitis, secondly decompression by the suprapubic route and thirdly prostatectomy in two stages. On admission to the hospital if there is complete retention of urine the patient is immediately prepared for suprapubic cystotomy which is done under local anaesthesia in order to avoid

pulmonary complications as most of these patients are subject to bronchitis. After this preliminary cystotomy there is a marked improvement in the general outlook of the patient. In mild cases a simple diuretic mixture with hexamine is given.

In cases where there is much congestion of the prostate due to cystitis this preliminary cystotomy relieves the congestion and in those cases where both the lobes are not hypertrophied the patient can pass urine freely. One such patient (case no. 12) was admitted with retention of urine and suprapubic cystotomy was done in December 1945. He felt so relieved that he did not consent to prostatectomy at that time and had to come again after 18 months for removal of the prostate. After cystotomy usually a patient is ready for prostatectomy in about 2 to 3 weeks time. For about a week prior to prostatectomy the patient is put on calcium lactate 15 grains three times a day and in some cases a few calcium gluconate, 10 per cent 10 c.c., injections are given. Patients who showed unusual bleeding during the first operation are also given a few injections of vitamin K prior to the second operation. If the systolic blood pressure be below 100, care is taken to bring it to at least 105 by general tonics and careful dieting.

Prostatectomy is done under general anaesthesia. After the enucleation of the prostate complete toilet of the prostatic cavity is done by gauze pack which is changed on the third day. The cavity is repacked if there be slightest indication of oozing of blood, otherwise a rubber tube is put in for drainage.

Restlessness is always complained of after this operation and this is relieved by bromide and chloral each 20 grains in 6 oz. normal saline per rectum. In one case the patient was given an injection of morphine. This relieved him much but there was complete suppression of the urine for about 8 hours and patient ultimately recovered after hypertonic saline and glucose injections. Sulpha drugs were not used as they cause suppression of urine—the kidneys in these cases being not healthy due to constant back pressure.

Penicillin treatment.—For fever and secondary infection patients were put on penicillin treatment. The mode of giving penicillin in all the cases was as follows: A solution of sodium salt of penicillin (containing 100,000 units) in 20 c.c. sterile normal saline was used and of this solution 4 c.c. (containing 20,000 units) were injected intramuscularly every 3 hours—syringe being sterilized by boiling and the penicillin solution being always kept in refrigerator. The time for stopping penicillin injections was determined by a fall of temperature and pulse rate to normal level and aseptic condition of the wound. Minimum period of penicillin injections was 3 days and maximum 12 days. This generally improved the prognosis. One of the very common complications in these cases is atony of

the bladder. The following mixture gave good results :—

Acid hydrochlor dil. ℥ x
 Liq. strychnine hydr. ℥ iii
 Aqua oz. 1
 Twice daily after meals for about
 10 to 15 days.

Summary

1. Thirteen cases of prostatectomy are reported. Eleven were done in two stages and two in one stage. Twelve cases were discharged cured and one died.

2. Prostatectomy in two stages is relatively a much safer procedure. It gives the patient

Case notes

Serial number	Name, age and caste	Course of the case in brief	Result.
1	Ali Bux, 60 years, Mohammedan (male).	Admitted 16-7-45, suprapubic cystotomy 18-7-45, prostatectomy 6-8-45. Glucose 25 per cent 40 c.c. intravenously on the day of prostatectomy. Course protracted—attack of enteritis. Symptomatic treatment and liver injections for 3 weeks.	Cured 21-9-45.
2	Hidayat Ullah, 64 years, Mohammedan (male).	Admitted 28-8-45, severe cystitis—BP 95/65. Suprapubic cystotomy 31-8-45, prostatectomy 17-9-45, fever for 7 days 99 to 103°F. Hypostatic congestion of lungs, morphia injection given after prostatectomy resulting in suppression of urine for 8 hours, function of kidneys restored with glucose and saline injections. Penicillin course for 7 days, progress slow. Vitamin B oral given to tone up general health.	Cured 26-12-45.
3	Mohabbat, 50 years, Mohammedan (male).	Admitted 3-10-45, severe cystitis, suprapubic cystotomy 9-10-45, prostatectomy 12-11-45. Glucose and calcium gluconate injections, fever for 4 days 99 to 101°F. Hypostatic congestion of lungs. Penicillin course for 7 days.	Cured 26-12-45.
4	Imam Bux, 55 years, Mohammedan (male).	Admitted 19-11-45; suprapubic cystotomy 22-11-45, prostatectomy 10-12-45, glucose 25 per cent 80 c.c. and calcium gluconate injections on the day of prostatectomy followed by 80 c.c. glucose intravenously in the next 2 days. Progress satisfactory.	Cured 13-1-46.
5	Mohd. Ishaq, 65 years, Mohammedan (male).	Admitted 7-4-46, severe cystitis, suprapubic cystotomy 9-4-46, prostatectomy 29-4-46, glucose 25 per cent 50 c.c. intravenously after operation, had hypostatic congestion of lungs. Penicillin course for 4 days.	Cured 26-6-46.
6	Man Singh, 60 years, Hindu (male).	Admitted 22-4-46, prostatectomy one stage operation 26-4-46. calcium gluconate and glucose intravenously before and after operation. Rectal saline and glucose after operation. Temperature 99 to 102°F. for 5 days. Penicillin course for 5 days. Progress satisfactory. Duration comparatively short.	Cured 7-6-46.
7	Farhat Husain, 55 years, Mohammedan (male).	Admitted 2-5-46, severe cystitis, albumin in urine ++, acetone +, blood urea 56 mg. per cent on admission. Heart slight dilatation, suprapubic cystotomy 6-5-46, vitamin K 3 injections. Blood urea 20 before second operation, prostatectomy 7-6-46, glucose and calcium gluconate intravenously. Penicillin course for 12 days, vitamin B and iron tonics.	Cured 15-7-46.
8	Chait Ram, 60 years, Hindu (male).	Admitted 28-7-46, suprapubic cystotomy 2-8-46, prostatectomy 20-8-46, glucose 25 per cent 40 c.c. intravenously before and after operation. No complications.	Cured 22-9-46.
9	Abdul Ghani, 60 years, Mohammedan (male).	Admitted 21-8-46, suprapubic cystotomy 26-8-46, prostatectomy 21-10-46. No complications.	Cured 20-11-46.
10	Iswari, 60 years, Hindu (male).	Admitted 25-11-46, general health good, suprapubic cystotomy 27-11-46, prostatectomy 13-12-46, calcium chloride 10 per cent 10 c.c. and glucose 25 per cent 50 c.c. intravenously after operation. Penicillin course for 3 days. No complications.	Cured 22-1-47.
11	Dori Lal, 70 years, Hindu (male).	Admitted 15-3-47, suprapubic cystotomy 17-3-47, prostatectomy 7-4-47, glucose 25 per cent 50 c.c. on the day of operation. Penicillin course for 4 days.	Cured 11-5-47.
12	Ram Chandra, 50 years, Hindu (male).	Admitted 9-12-45, suprapubic cystotomy 12-12-45. Discharged from the hospital on 25-1-46 when he could pass urine freely and did not like to undergo operation for prostatectomy. Re-admitted for retention of urine 28-5-47, prostatectomy performed on 30-6-47 in one stage. There was also a small stone impacted in the prostate. Penicillin course for 6 days.	Cured 1-7-47.
13	Peer Bux, 60 years, Mohammedan (male).	Admitted 7-11-45, albumin +, heart sounds weak, suprapubic cystotomy 12-11-45, prostatectomy 7-12-45, temperature for 2 days up to 100°F. only. Condition went on getting low after operation. Glucose 25 per cent 50 c.c. daily for 10 days. Coramine and other cardiac tonics given without much relief.	Died 14-1-46.

time to build up an immunity against infection and a chance for the renal function to improve. Thus prostatectomy in two stages despite its obvious disadvantages is a sound procedure to adopt particularly by those surgeons who have to treat such patients in surroundings not suited to specialized surgery.

3. Penicillin is by far the safest and best remedy to check secondary infection.

My thanks are due to Dr. P. N. Khanduri, P.M.S., Second Medical Officer in Sub-charge, for his assistance.

[The supervision of malignancy is no longer accepted generally.—EDITOR, I.M.G.]

ANALYSIS OF SURMA

By KUNDAN SINGH, M.Sc.

(From the Department of Pharmacology and Therapeutics, King Edward Medical College, Lahore)

SURMA is traditionally used as an application to the eyes in children of both the sexes, and in

be due to the insidious type of lead poisoning. Frequent abortions and sterility in women may, in the absence of other causes, be due to lead alone.

In view of these facts, it was thought desirable to find out the composition of surma as sold and used in the Punjab. Twenty samples have been examined. They have all been found to be lead sulphide (galena).

It would be interesting to find out if the application of surma can cause lead poisoning.

Experimental.

Lead, antimony, zinc, iron, and sulphur were estimated gravimetrically as lead sulphate, antimony oxide (Sb_2O_3), zinc pyrophosphate, ferric oxide and barium sulphate respectively. Copper was estimated volumetrically by titration with thiosulphate (Naish and Clennell, 1929).

Analysis of different samples of 'surma'

Number	Pb, per cent	Silicious matter, per cent	Cu, per cent	Antimony, per cent	Iron, per cent	Zinc, per cent	Sulphur, per cent	Silver
1	72.70	6.54	..	0.19	5.51	0.39	14.65	A trace.
2	85.22	0.89	..	..	0.25	..	13.64	..
3	79.41	1.66	0.47	..	1.81	0.75	15.84	..
4	81.91	1.13	..	..	0.64	0.45	15.87	..
5	74.29	5.03	..	..	4.45	1.26	14.62	..
6	80.57	1.97	..	..	1.90	0.53	14.93	..
7	77.28	5.84	..	..	3.13	..	13.72	..
8	83.10	1.34	..	..	1.41	0.13	13.92	..
9	77.81	5.29	..	..	2.94	..	13.86	..
10	84.11	0.97	0.49	..	0.47	..	14.43	..
11	86.10	0.35	..	..	0.15	..	13.50	..
12	75.47	3.94	..	0.57	5.42	..	14.74	A trace.
13	82.12	1.87	..	..	1.17	..	14.84	..
14	84.09	0.72	..	0.12	0.47	0.34	14.26	..
15	77.05	7.04	..	..	2.25	0.09	13.51	..
16	85.14	1.02	..	..	0.13	0.14	13.57	..
17	80.12	1.79	..	..	1.78	0.57	15.71	..
18	83.34	1.27	0.33	..	0.89	0.23	13.94	..
19	86.41	0.33	..	..	..	..	13.25	..
20	79.89	2.21	..	0.61	1.95	0.29	15.04	..

grown up girls and women. It is supposed to act as a tonic to the nerves of the eyes and to strengthen the sight.

In books on indigenous drugs in English, it is described both as trisulphide of antimony and lead sulphide (Ainslie, 1813; Chopra, 1933; Dey, 1896; Naish and Clennell, 1927; and Watt, 1889).

In connection with the investigations on lead content of normal human tissues, excreta and hair, it was found by Bagchi (1941) that hair of Hindu women was very rich in lead. The source of lead was traced by him to be cheap vermilion which contains red lead, the lead being absorbed through the scalp where it is applied. This was indicated by high lead figures of the urine and faeces of these women.

It was further suggested by him that some common ailments, such as anaemia, menstrual troubles, frequent abortions, dyspepsia, nervous troubles, high blood pressure, weariness of brain and body, etc., which are frequently met with among Hindu women, especially in Bengal, may

Summary.

Twenty samples of surma as sold in the bazars of the Punjab were collected and analysed. These were found to be galena.

I am grateful for the suggestion of the problem and guidance to Dr. Khem Singh Grewal, Ph.D. (Cantab.).

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A Mirror of Hospital Practice

PENICILLIN IN SUBACUTE NEPHRITIS

By H. C. JAIN, M.B., B.S. (Bom.)

Chandan Nivas, Ajmer

S., FEMALE, age 4 years.

Present complaints.—1. Swelling of the eyelids, face, abdomen, legs and forearms.

2. Irritative cough.

3. Intermittent attacks of fever.

Origin, duration and progress.—About three months back the child got an attack of pain in the right leg and after five days of this attack swelling in the eyelids and legs was observed one morning.

The swelling of the eyelids and legs almost disappeared after twenty days of treatment though the child continued to have pain in her right leg all this time.

The swelling then increased and extended to abdomen and forearms as well.

The irritative cough set in about 22nd February and has since then persisted.

The fever was intermittent and never rose higher than 102°F.

Past history.—The child had an attack of double pneumonia about two years ago.

Previous medications.—Iron diuretic mixture, alkaline diaphoretic mixture, and neptal tablets were all tried. The cedema with administration of neptal tablets increased considerably.

I was called to see the case on 5th March.

Examination.—Face swollen more so in the region of eyelids. Conjunctiva pale; nails pale. Tongue clean and moist. Throat congested. Skin—shiny and tight over face, legs and abdomen. Pitting on pressure on the dorsum of foot extending up to the knee-joints.

Alimentary system.—Abdomen was full. Umbilicus was transversely stretched. Percussion dullness in the flanks. Fluid thrill was positive. Liver was palpable four fingers and softish in consistency.

Cardiovascular system.—Pulse 80 per minute. Rhythm regular. Force good. Tension fair. Heart borders normal. Heart sounds normal.

Respiratory system.—Rate 20 per minute. Rhythm regular. Both sides moving equally. A few basal râles were audible.

Urine examination.—Urine: Reaction varied. Specific gravity 1012 to 1020, albumin present. Granular and epithelial casts in the beginning only. Pus cells in the beginning only.

Diagnosis.—A diagnosis of subacute nephritis was made on the pathological basis of a septic focus in the tonsils and parenteral administration of penicillin began, though with some diffidence because of the subacute nature of the case.

In all it was aimed to give two lac units of penicillin sodium in twenty intramuscular

injections with a concentration of 10,000 units per c.c. in normal saline made with pyrogen-free distilled water at three hourly intervals.

After the administration of a lac units the child became extremely needle shy and it was decided to give three more injections only with a concentration of 25,000 units per c.c. making a total of 175,000 in all.

The needle and the syringe were boiled every time and ether was employed to sterilize the skin and the cap of the penicillin vial which was kept in ice when not being used.

Side by side a citrate diuretic mixture was given.

Diet.—No salt was given. Honey was given, also weak tea, milk, orange and lime juice, salt-free butter and toffee.

A dramatic improvement was noticed on the third day after the course of penicillin when a profuse diuresis set in and continued on the fourth day as well by which time there was not a trace of cedema left all over the body. The albumin however continued to be present though in diminished quantity.

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AN UNUSUAL CASE OF SUPPRESSION OF URINE

By N. K. GUHA NIYOGI, B.S.C., M.B.

Chapai-Nawabganj, Malda

I was called in the early morning of 27th March, 1947, to attend a case of suppression of urine in an unmarried girl of 16. I was told that she had last urinated at 11 a.m. of 26th March, 1947. She had passed a very restless time after the suppression. I reached the place at about 1 p.m. and found her screaming.

On my arrival I was shown the huge swelling at the lower abdomen. As the mass was the distended bladder and as she was screaming, I, at once, made up my mind to relieve the bladder first and then to investigate the matter in details. She was put on the end of a bedstead for easy work.

On exposing the external genital organs, I noted:—

1. The vestibule of the vagina—the part stood out very prominent, seemed bulged and pushed forwards, making the labia gape apart.

2. The urethral opening seemed pushed upwards as far as the clitoris.

3. There was a complete septum across the vagina—imperforate hymen. The septum was very tough and thick.

To me, it seemed, at the outset, that all these troubles were due to the internal pressure caused by the distended bladder.

The part was thoroughly washed and catheter was passed. As the urethra was pushed upwards, I experienced some difficulty in passing the catheter. However a huge quantity of urine came out and the patient got immediate relief. Though a huge quantity of urine was drawn, still no change in the external genital organ was noticed, which struck me most.

Past history.—1. Burning sensation during micturition—duration 2 to 3 years.

2. She had to strain sometimes before the actual flow of urine commenced. At the beginning, urine came out in drops then in flow—duration about 2 to 3 years.

3. No history of appearance of menstruation.

4. She admitted that she used to get some painful sensation and some heaviness in the waist every month lasting for 3 or 4 days—duration 2 to 3 years.

On examination I found :—

1. A tough and thick membrane completely closing the vagina. The area of the vestibule was pushed forwards. This portion stood out very prominent separating the labia wide apart.

2. On rectal examination a huge mass (hard to feel, but not as hard as stone) was palpable between the finger inside the rectum and the finger placed over the lower abdomen.

3. A mass was also felt between the finger inside rectum and that over the vestibule.

4. The girl was 16 years old, still she did not show any marked development of the sexual organs—the breasts not much developed, no pubic hair.

From all these I diagnosed the case to be suppression of urine caused by accumulation of menstrual blood inside the vagina, which was closed by imperforate hymen. I thought of making an incision and removing the cause of the suppression. But I was not prepared for it.

Next day I was again awakened from my bed for the same troubles. I was told that there was no urine since the last catheterization. I reached the place at 2 p.m. That day the urethra seemed to be more pushed upwards for which I had to pass the catheter with some difficulty.

I made an exploratory puncture, with a needle fitted to a hypodermic syringe, in the tough membrane (hymen) to aspirate fluid, if any. Inside the syringe I found some black, thick tarry fluid. This confirmed my diagnosis. I incised the hymen. On opening, a huge quantity (about 1½ seers) of thick, black tarry fluid (accumulated menstrual blood) came out of the vagina. There was no clot in it. After this, no mass could be felt rectally nor was any bulging of the vestibule seen separating the labia. The patient is now doing well.

Points to note.—1. A girl of 16 with imperforate hymen. The hymen formed a complete septum. There was atresia of the vagina causing no symptoms until the onset of puberty.

2. Menstruation started long ago without appearance of any flow—apparent amenorrhœa.

She felt general discomfort and usual symptoms of approaching menstruation without any actual flow.

3. Menstrual blood accumulated inside the vagina for some years and a huge mass 'Hæmatoecolpos' was formed which compressed the urethra causing the suppression of urine. Burning sensation during micturition and straining during micturition with coming of urine in drops were all pressure symptoms.

DELIVERY OF A DEAD FŒTUS PER RECTUM

By S. K. SRIVASTAVA, L.M.F.

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THIS type of case rarely presents itself and it is therefore thought that report on such a case would be of interest.

A female Mohammedan, aged about 35 years, came to the Hospital Nagod in a bullock cart from Bundelkhand on 24th March, 1947, with the complaints of constant pain in the abdomen and offensive discharge of pus through the rectum.

The patient was very much debilitated, anæmic, and could neither stand erect nor walk. She had temperature 99°F. and the pulse rate was 120 per minute.

Past history.—Three years back she had given birth to a child who was born healthy but died after 6 months. She gave no specific history of syphilis or gonorrhœa. She conceived again and carried 8½ months till the end of the month of December 1946. She had pain in the abdomen throughout the whole period of confinement.

As she was illiterate and a village woman, she did not mind the trouble or worry about the consequences. At the end she felt no movement of the fœtus in the abdomen, believed the child was dead, even then she did not mind and carried on.

By and by as the days passed she began to get discharge of pus and offensive fluid per rectum and believed the dead fœtus had begun to come out part by part and thus in a few days she would get rid of it. Thus three months passed away. Now when attendants thought she had become bed-ridden and there was no hope of her surviving they brought the case to the hospital for the proper treatment.

I did not believe the history of the fœtus being cleared off through rectum.

Palpation.—Lump of swelling felt above the pubis up to 2 inches below the umbilicus.

P. V. examination.—Cervix contracted. External os so much constricted that even the uterine sound could not be passed in.

Rectal examination.—I passed my finger in the rectum, some foul discharge of pus came out. I felt some hard, long, stick-like thing against my finger. By manipulation I could

take out the same and to my surprise it was the radius of the foetus. Further, I manipulated and saw a big, two fingers' breadth, fistula in the rectal wall between the lower and posterior part of the uterus and rectum (utero-rectal fistula) through which I could feel a heap of bones inside.

Next day under chloroform anaesthesia, firstly I tried to dilate the cervix but it was so badly contracted that I had to discard this route. Then through rectum I dilated the fistula; by manipulation, with finger I removed all the remnant of the dead foetus—putrefied portion of organs and bones of skull, face, ribs and limbs. In between operation I washed and flushed out all the debris inside the uterus by douching with dettol lotion through the opening of the fistula. I cut clean the ragged margins of the fistula and left it open.

The patient was given glucose saline intravenously and brought to the inpatient ward.

She was given ergot quinine mixture to promote contraction of the uterus, and to prevent further infection, cibazol with alkali was given orally.

Daily douche of dettol lotion per rectum was administered. After a week iron mixture as tonic was given.

At the end of the 3rd week the fistula healed and the patient was discharged cured on 15th April, 1947.

She regained her health and became able to walk to her relation in the town.

I advised her to keep on taking some general tonic.

Conclusion

1. The admirable tolerance of the patient that she could keep full-term dead foetus for 4 months with no serious effect.
2. She did not develop sepsis having such an open chance.
3. Delivery of the whole skeletal part of the foetus per rectum.
4. Rapid healing of the fistula and uneventful recovery of the patient.

AN UNUSUAL CASE OF ILEO-CÆCAL TUBERCULOSIS

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THE frequency of tuberculous involvement of the ileo-cæcal region as a cause of chronic indigestion is only recently being realized. Formerly it was considered as one of the rare causes of a lump in the right iliac fossa. More and more cases are being recognized and successfully operated upon nowadays. During the last 12 months, the author has come across at least 12 well-authenticated cases.

The case described below presented certain peculiar features which makes its publication worth while.

Case report

S. L. D., 22, Hindu female, complained of occasional vague abdominal burning pain and indigestion for 6 months. She was rather uncertain about the exact nature of the pain and besides its being felt mostly in the right lower quadrant of the abdomen could not give more details about it. The pain had no relation to food. She also had anorexia and had lost a certain amount of weight during the last year.

She had also felt an occasional lump in the right iliac fossa and in fact had been admitted into the hospital as a case of suspected appendicular lump.

About a year ago, she had been admitted into the gynaecological ward of the hospital and had undergone an abdominal operation.

On admission.—She was a small frail woman, anæmic. There was a 4 inches midline lower abdominal scar.

A lump, size 2 inches \times 2½ inches, was easily felt in the right iliac fossa. It was slightly tender on pressure, freely movable in all directions and dull on percussion. Peristaltic sounds were normal.

P. V.—No abnormality was detected.

Investigation

Blood.—Hæmoglobin 55 per cent, red cells 2,800,000, white cells 8,500, polymorphonuclears 70 per cent.

Barium enema.—It showed a filling defect in lower half of ascending colon and cæcum. According to the radiologist the colon was very irritable and the meal very quickly passed through it into the small intestine—suggesting irritable colon? T.B.

Stool examination.—Normal.

Operation

Rectal paraldehyde and open ether were used. Right paramedian incision, 5 inches long, was made.

The mass was easily found in the right iliac fossa. It was much larger than could be felt manually before. It involved the cæcum, lower half of ascending colon and last 2 inches of ileum. It was firm and there were large numbers of nodules on the surface. Large masses of glands were palpable in the mesentery. The glands were firm but not hard as one would associate with malignancy. The colon was mobilized by incising the peritoneum in the right paracolic gutter. Mobilization was remarkably easy.

Right hemicolectomy was done by the method described by Rodney Maingot. Some difficulty was experienced in the excision of the mesentery owing to the very large number of enlarged glands present. About 6 inches of ileum were removed and the anastomosis of the ileum to the transverse colon was of the end to side variety, the open end of the transverse colon being closed. The V-shaped gap in the mesentery was closed

by suturing its cut margin to that of the transverse mesocolon and the posterior peritoneal wall repaired in the usual way.

The patient stood the operation well, and recovery was uneventful, except that she had diarrhoea on the 4th and 5th post-operative day, probably due to errors of diet.

About 3 weeks after the operation she developed an abscess in the abdominal parietes which healed after incision.

Points of interest

1. No significant symptom except occasional vague abdominal pain, dyspepsia and anorexia.
2. Free mobility of the lump.
3. Large number of nodules present on the surface.
4. Easy separation of the mass.

Pathological report

(S. Bhattacharya)

The mass: 1. *Macroscopic examination.*—The specimen consists of about 6 inches of ileum, caecum, appendix, ascending colon and about 4 inches of transverse colon. The area of the caecum and the lower half of the ascending colon is occupied by a large indurated mass, which shows the presence of numerous fair-sized tubercles on the surface (size of mustard seeds). The indurated area extends on to about 3 inches of ileum.

2. *Microscopic examination.*—(1) Giant cells of tubercular type, fair number; (2) much lymphocytic infiltration; (3) large amount of fibrosis; (4) caseation not much in evidence.

The lymph glands: 1. *Macroscopic examination.*—(1) Enlarged; (2) cut surface homogeneous, caseation not seen.

2. *Microscopic examination.*—(1) Giant cells, fair number; (2) marked fibrosis replacing the lymphoid tissue which is not much in evidence; (3) caseation—very little.

Diagnosis

Tubercular intestine, hyperplastic type.

A CASE OF HYPERTENSIVE ENCEPHALOPATHY WITH SUBARACHNOID HÆMORRHAGE IN ACUTE DIFFUSE GLOMERULO-NEPHRITIS

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A SIXTEEN year old married girl entered Krishnarajendra Hospital, Mysore, on 8th March, 1947, with complaints of oedema of the face and lower extremities and scabies for the past fifteen days. One year before admission she had an attack of scabies which was treated and cured.

On admission, the girl was conscious, the feet were swollen, and lesions of scabies with

secondary infection were found all over the body specially over the hands and feet. Blood pressure was 130/90 mm. of Hg. Urine revealed albumin +++, R.B.C. ++, and casts ++, and was high coloured with a specific gravity of 1025. There were no signs of upper respiratory infection. Pupils were normal. The heart was not enlarged. The sounds were of good quality. Lungs were normal. Liver and spleen were not palpable. W.B.C. count was 11,500 c.mm., R.B.C. count 3.5 million per c.mm., Hb. 75 per cent, sedimentation rate 40/10, blood urea 35 mg. per cent.

A diagnosis of acute nephritis with hypertension was made, the aetiological factor probably being pyoderma. After five days' stay in the hospital, she started complaining of headache and slight dimness of vision. The headache became intense towards the evening and the vision was almost lost. She vomited about six times and it was projectile in nature. At 6 p.m. on the same day she developed an epileptiform seizure which lasted for 2 minutes and became unconscious after the attack. Soon after the attack, the blood pressure was 150/110 mm. of Hg. She spent the night unconscious with six more attacks of convulsions, incontinence of urine and faeces, and frequent vomitings. The next morning, lumbar puncture revealed hæmorrhagic fluid which was under high tension. The fluid was intimately mixed with blood and never became clear even after taking a test-tubeful of fluid with frequent change in the position of the needle. The fluid did not clot on standing. On centrifuging, there was xanthochromia. There was no increase in the number of leucocytes and no micro-organisms could be detected under the microscope. The blood pressure was 140/110 mm. of Hg. On physical examination, there was paresis on the left side of the body with rigidity of the neck and a positive Kernig. She was found to curl herself to the left. Pupils were normal and fundi were normal. She was put on intravenous glucose 50 c.c. 25 per cent twice a day with injections of luminal and oral bromides. She was also put on penicillin 20,000 units every three hours. Within twenty-four hours the convulsions ceased. She regained consciousness, and complained of severe headache and dimness of vision. The lumbar puncture was repeated which had the same characteristics as before. Blood pressure had come down to 130/100 mm. of Hg. Blood urea was 45 mg. per cent. Paresis of the left side of the body, nuchal rigidity and Kernig's sign were still present. The treatment was continued with absolute rest in bed and orange juice. Four days later the patient was found to be quite conscious, speech was rational, external stimuli were appreciated. The quantity of urine passed by this time was 40 oz. a day. Blood pressure was 130/90 mm. of Hg. There was improvement in the paresis. Nuchal rigidity and Kernig's sign were negative. Lumbar puncture

revealed no pressure, the fluid coming out in drops in contrast to the continuous stream in the first two punctures. The fluid was coloured yellow and on microscopy there were no red cells nor leucocytes.

After a stay of twenty-eight days in the hospital she was discharged at her request with instructions to come and report after a month. At the time of discharge there was no oedema, blood pressure was 110/85 mm. of Hg., blood urea 35 mg. per cent. Few granular casts and few red cells were found in the urine and albumin was in traces. Scabies had been cured.

She was prompt in reporting her condition exactly a month later. Except for eczematous ulcerations around the waist, nothing abnormal was detected on physical examination. Urine was free from albumin, red cells and casts. Urine output was between 40 to 50 oz. a day. Blood pressure was 110/80 mm. of Hg. After a stay of one week, the ulcerations around the waist disappeared with local application of calamine lotion, oral cibazol and intravenous caluseptasine.

Comment.—The first thing that strikes in the differential diagnosis is an accidental puncture of the spinal veins. The fact that the fluid did not become clear with the change in position of the needle, the intimate mixture of the blood with the cerebrospinal fluid, the absence of clotting and the presence of xanthochromia speak strongly against the accidental puncture. Acute meningitis is out of question in the absence of an increased number of leucocytes and micro-organisms in the fluid. Rupture of a berry aneurysm either spontaneous or as a result of an increased arterial tension is the only other alternative diagnosis. But the cerebral episode in association with increased cerebrospinal pressure and increasing arterial tension is more in favour of hypertensive encephalopathy.

In the acute stages of glomerulo-nephritis, it is the danger to the heart and to the brain which is of first and highest importance rather than to the kidney itself. 'Almost every case that dies in the acute stage of this disease dies of cardiac insufficiency'.—Volhard. The danger to the brain though less frequent is more startling and dramatic because of the cerebral oedema causing the convulsions of the so-called eclamptic uræmia, which has nothing to do with the uræmia caused by renal insufficiency. This cerebral-symptom complex is termed hypertensive encephalopathy by Oppenheimer and Fishberg. It is to be noted that the higher the blood pressure the greater the danger to the brain. Headache becomes intense accompanied by vertigo. Vomiting is projectile and without effort. Amaurosis affects both eyes, the vision returning to normal within a few hours or days if the patient survives. The blood pressure is high before and during the attack. The cerebrospinal fluid is under increased pressure, the fluid gushing from the needle in a steady

stream. Though unusual, it is possible to find blood in the cerebrospinal fluid. One case has been reported by Dewar and Walmsley (1945) where subarachnoid hæmorrhage was detected at post mortem in a case of relapsing fever with acute glomerulo-nephritis. The possibility of hæmorrhage into the subarachnoid space should be in mind whenever the epileptiform seizures are preceded by nuchal rigidity, a positive Kernig and an increasing blood pressure. 'It seems likely that . . . the cerebral arterioles are unable to constrict with the force necessary to keep pace with the great rise in arterial pressure; the result is that blood enters the cerebral capillaries under preternaturally great tension and transudation is augmented'.—Fishberg (1939). The already injured capillaries as a result of generalized capillaritis may have to yield to this preternatural great tension.

My thanks are due to Lieut.-Colonel R. Nagendran, B.Sc., M.B., B.S., F.R.C.S. (Eng.), Medical Officer, Krishnarajendra Hospital, Mysore, for having permitted me to utilize the materials from the hospital.

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A CASE OF BLACKWATER FEVER

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GUPTA *et al.* (1942) reported on the anti-hæmolytic property of *Vitex peduncularis in vitro*, while clinically Chaudhuri and Rai Chaudhuri (1945) observed its apparent efficacy in a case of quinine hæmoglobinuria. Singh and Singh (1944) claimed uniformly good results with antivenene in blackwater fever cases. No report is yet available to us on paludrine being tried in this disease. The following case in which all the three drugs were tried is therefore worth reporting although none of them seemed to influence the hæmolytic process.

Case report

A Bengali male, aged 24 years, was admitted to the Carmichael Hospital for Tropical Diseases on the 13th January, 1947, for blackwater fever of six days' duration. He lived in a hyperendemic rural area about 30 miles from Calcutta and gave a past history of

having had many attacks of malaria. Two of his brothers died of blackwater fever—one seven years ago and the other only eight days before the patient's admission to the hospital.

The onset of present illness was sudden with rigor and rapid rise of temperature to 104°F ., and he took 10 grains of quinine sulphate by mouth. Three hours after the dose he started passing 'blackwater' and also had nausea and vomiting. Definite jaundice was noticed about the third day. The attending physician kept him on absolute rest and gave alkalies by mouth, daily intravenous injections of glucose, calcium and vitamin C as well as one injection of vitex peduncularis (Pedunculine of Gluconate Laboratories) but to no effect. High remittent type of fever with daily rigors persisted and the quantity of urine gradually diminished.

The patient was brought to hospital very ill. He looked alert and rather apprehensive and complained of nausea and dysuria. He appeared very prostrated, dehydrated and pale. The temperature was 101°F ., pulse rapid and feeble and blood pressure 92/28 mm. of Hg. There was a hæmic murmur in the heart; the lungs were clear and the spleen was just palpable. The urine was very scanty and the specimen presented the appearance characteristic of the disease. It was slightly acid in reaction and loaded with albumin; benzedrine reaction was strongly positive, and on microscopic examination, hyalin and granular casts, few pus cells and very few red cells could be found. Blood examination revealed severe degree of anæmia with positive indirect van den Bergh reaction (see table), while repeated thick films showed no malarial parasites. The Wassermann reaction was negative.

Treatment and progress.—In view of the impending circulatory failure the patient on admission was given a transfusion of 250 c.c. of plasma followed by four-hourly injections of suprarenal cortical extract alternately with coramine hypodermically. He was also given two injections of pedunculine 2 c.c. each on the same day, besides a mild alkaline mixture four hourly. He was kept on complete bed rest and given milk diluted with barley water, orange juice, glucose and plenty of water to drink. (He had practically no food except drinks of barley water, *dab* water and plain water with or without glucose for six days before admission.) A dose of phenobarbitone was given at night to ensure sleep.

14th January, 1947. The general condition of the patient was practically same, but there was profuse diuresis. The urine appeared clearer in the morning but in the afternoon, following a rigor with a high rise of temperature, black urine was again passed. Extract of vitex peduncularis by mouth in daily doses of $2\frac{1}{2}$ oz. was given and continued for five days. Blood pressure 90/32.

15th January, 1947. Diuresis continued, but following another rigor and passage of very dark

urine the patient became extremely prostrated and his general condition deteriorated. A single dose of paludrine 300 mg. was given empirically. Intravenous injections of 50 c.c. of 25 per cent solution of glucose with 400 mg. of vitamin C twice daily were started. He was also put on antivenene intravenously 30 c.c. *stat* followed by 10 c.c. four hourly for three days.

16th January, 1947. The patient was in an alarming state with profound anæmia (hæmoglobin 3.3 gm., 24 per cent), jaundice, persistent hæmoglobinuria and blood pressure 86/34 mm. of Hg. Adequate urinary output was however maintained. A transfusion of 250 c.c. of blood was given very slowly by drip method without any untoward reaction. In the evening following an injection of antivenene he had a severe rigor followed by passage of urine which was darker than any previous sample.

17th January, 1947. The patient appeared a little better. Another blood transfusion was started but severe rigor and high rise of temperature followed after only 50 c.c. were given and it had to be discontinued.

18th January, 1947. The morning specimen of urine was somewhat clearer but again became very dark after a severe rigor in the afternoon following a glucose injection. Blood pressure 83/34 mm. of Hg.

19th January, 1947. The patient's condition seemed to deteriorate, and the hæmolytic process was uninfluenced by antivenene and vitex peduncularis both of which were stopped and so also the glucose injections which were disliked by the patient. He was put on injections of whole liver extract (T.C.F.) as well as ferrous sulphate gr. 6 thrice daily by mouth. The alkaline mixture was continued.

20th January, 1947 to 26th January, 1947. The fever gradually came down; there were slight rigors on 20th and 21st only. The urine gradually became clearer though occasional darker samples were passed. The patient felt hungry and he was fed liberally.

27th January, 1947. Patient afebrile; blood pressure 98/42 mm. of Hg.; urine clear, no albumin.

Convalescence—uneventful. He had altogether 17 injections of liver extract (4 c.c. each) and iron for 21 days. There was steady improvement of the general condition and the blood picture (see table). He was discharged cured on 19th February, 1947.

Thick films were examined for malaria parasites almost daily with negative results.

Points of interest

1. History of blackwater fever in the family.
2. The patient was desperately ill with almost daily rigors, profound anæmia and hypoproteinæmia which was mainly due to reduction of the albumin fraction.
3. Plasma transfusion brought on marked diuresis averting threatened anuria on admission.

TABLE

Date	BLOOD COUNT		M.C.V.	Reticulo- cyte, per cent	Bilirubin, mg. per cent	W.B.C.	PLASMA PROTEINS, GM. PER CENT		
	Hemoglobin, gm. per cent	Red cells per million					Total	Albumin	Globulin
13-1-47	33	1.38	115.9	..	2.5	5,200	5.5	2.8	2.7
16-1-47	24	..	..	..	..	..	..	..	..
20-1-47	24	1.04	133.3	2.1	1.5	..	4.8	2.4	2.4
24-1-47	24	0.88	..	33.6	..	6,000	..	..	..
29-1-47	48	2.05	112.2	17.6	0.4	6,000	5.1	2.8	2.3
6-2-47	58	2.65	113.2	8.2	0.2	6,800	6.2	3.5	2.3
19-2-47	84	4.1	96.2	..	..	7,200	6.8	4.4	2.4

4. A blood transfusion gave rise to a temporary improvement of the general condition but it could not be repeated a second time owing to severe reaction.

5. Vitex peduncularis and antivenene therapy appeared disappointing; at least they had no immediate good effect.

6. A single dose of paludrine 300 mg. was given without any appreciable effect (good or bad).

7. Improvement of the patient's condition seemed spontaneous after cessation of intensive treatment, and the convalescence was undoubtedly hastened by administration of hæmatinics.

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A CASE OF DIABETES INSIPIDUS ASSOCIATED WITH DIABETES MELLITUS

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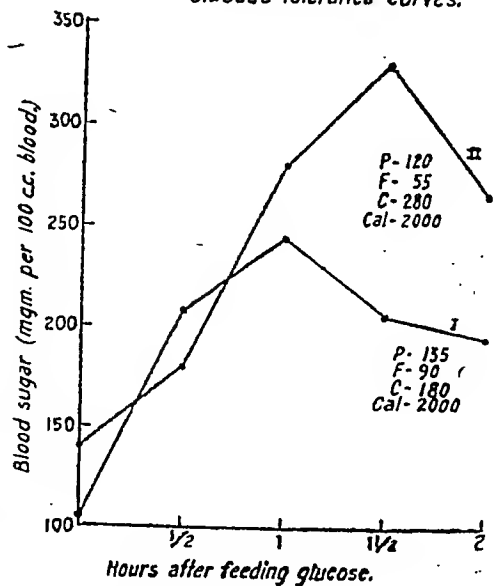
THE patient, a married Hindu male, aged 54 years, a collecting sarkar by occupation, was admitted into the Carmichael Hospital for Tropical Diseases on the 13th February, 1947, for the following complaints: polyuria, nocturia, polydipsia, weakness and glycosuria. The duration of all these complaints was only two months. The patient gave a history of syphilis three months back for which he was treated by the venereal department of the Medical College, Bengal.

On admission the patient appeared very ill. As he was excreting sugar in urine the writer

thought that he was developing diabetic coma. His blood sugar was immediately estimated and it was found to be only 100 mg. per 100 c.c. of blood. His blood pressure was 110 mm. of Hg. systolic and 65 mm. of Hg. diastolic. The patient was kept on absolute rest in bed and was given a diet consisting of protein 135 gm., fat 90 gm. and carbohydrate 180 gm. This diet furnished him approximately 2,000 calories. 24-hours' specimen of urine was collected every day.

On the fifth day of his stay in the hospital the patient stopped excreting sugar in his urine although the volume of urine excreted which varied between 5 and 6 litres did not diminish.

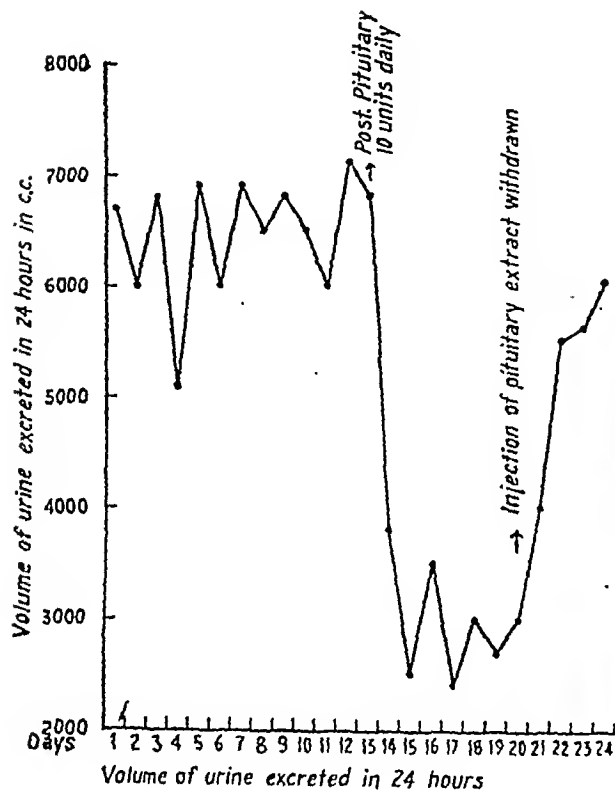
FIG. 1.
Glucose tolerance Curves.



An oral glucose tolerance test was performed on the 17th February. The glucose tolerance curve (I) is shown in figure 1. Although the urine did not contain any sugar when the fasting blood was taken the patient excreted sugar after completion of the sugar tolerance test. The glucose

tolerance test showed a diabetic type of curve. The persistence of polyuria, even when the urine was sugar-free, suggested that the case might be a case of diabetes insipidus. The patient was, therefore, given a daily injection of 10 units of posterior pituitary extract. The volume of urine excreted was markedly diminished as a result of the injection. But as soon as the injection was stopped the patient began to excrete a large volume of urine. The volume of urine excreted in different days is shown in figure 2.

FIG. 2.



The effect of a high carbohydrate diet on the glucose tolerance test was also studied. From the 5th of March the patient was given a diet consisting of protein 120 gm., fat 55 gm. and carbohydrate 280 gm. This diet furnished approximately 2,000 calories per day as before. The oral glucose tolerance test was performed on the 12th of March, 1947. The patient excreted no sugar before the administration of glucose but the urine collected two hours after feeding glucose contained sugar. The glucose tolerance curve (II) is shown in figure 1. It will be seen that the high carbohydrate diet further diminished the tolerance to glucose. The glucose tolerance curves indicated that the patient was also suffering from mild diabetes mellitus.

Laboratory findings.—Urine showed presence of sugar for the first five days only. The specific gravity of the urine was 1005 and there was no other abnormality. Blood examination showed a white cell count of 8,900 per c.mm. of blood with 63 per cent neutrophils, 29 per cent lymphocytes, 4 per cent monocytes and 4 per cent eosinophils.

The red blood cells were 4.4 millions per c.mm. of blood and haemoglobin was 14 gm. per 100 c.c. of blood. Stool did not contain any protozoa or ova. The vitamin C nutrition, as determined by the saturation test, was normal. The Wassermann reaction was negative.

X-ray findings.—A skiagram of the pituitary fossa was taken and the radiologist's opinion was 'the pituitary fossa appears to be smaller than normal'.

Discussion.—The excretion of a large volume of very dilute urine of low specific gravity without any traces of albumin or casts, the negative Wassermann reaction, the diminution of the volume of urine after injection of posterior pituitary extract, the smaller pituitary fossa and low blood pressure point out that this was a case of diabetes insipidus. After hospitalization the patient stopped excreting sugar even on a moderately high carbohydrate diet. The lowered sugar tolerance, however, suggested that the patient was also suffering from mild diabetes mellitus. The coincidence of both diabetes insipidus and diabetes mellitus in the same patient is not very common.

[The possibility of a reaction in the pituitary gland, caused by the treatment for syphilis, remains.—Editor, I.M.G.]

A CASE OF MANIACAL EXCITEMENT FOLLOWING LARGE DOSES OF ATEBRIN

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RECENTLY I was called to see a person who started behaving like a mad man all of a sudden. Previously he had been quite well and had no such attacks.

The patient was not feeling up to the mark that morning and having felt some chill imagined that he was getting fever and took 2 yellow tablets with a little water. Then he went out for a walk with some of his friends, leaving the house by 10 a.m. and returning by about 1.30 p.m. in the hot sun with bare head. The sun was very severe that day. After returning home he got all of a sudden excited and into a state of anxiety. He was uncontrollable, fretful and raving. He assaulted his father, mother and everybody in the house and was unmanageable. He had sudden attacks of panic in which he rushed blindly out into the open street, wandering aimlessly with ceaseless agitation. With much difficulty he was forced into the house by a number of people and locked up in a room.

I couldn't examine the patient in detail on account of his restlessness. Here are a few findings :—

The patient, a well-built sturdy man of about 25 years, was kept restrained by half a dozen persons. He was abusing them and sometimes spitting also. Pulse 92 per minute. Respiration 25. Temperature (armpit) 99.5. Heart and

lungs—clear. Liver not enlarged. Spleen just felt, eyeballs deviated outwards and upwards. Pupils dilated and sluggish to light. Biceps and kneejerks exaggerated.

Previous history.—The patient was demobilized from military service about a month back. He had come here to stay with his parents. He had told his father that he was getting malarial fever in the army and that he was advised to take regularly some yellow tablets. He had brought a good supply of the same tablets and was taking 2 or 3 tablets at a time once or twice a day and might have consumed quite a sufficient number during his stay of one month here. There was no history of alcohol or tobacco consumption. On further probing I was able to elicit that there were some misunderstandings between the son and the parents on the choice of a bride and that there were some scenes and heated arguments in the house for some days. The precipitating factor for the psychological derangement was there all right.

Now the problem of diagnosis came up. I considered the following for differential diagnosis :

1. Heat exhaustion and sunstroke.
2. Cerebral malaria.
3. Acute alcoholic intoxication.
4. Affective disorder—probably due to the large amount of atabrin or quinacrine consumed.

In heat exhaustion a direct heat action upon the brain occurs in addition to the salt loss and the picture is akin to that of surgical shock. In sunstroke hyperpyrexia will be present. But patient was perspiring well, with no hyperpyrexia and no signs of shock.

Cerebral malaria—temperature 99.5. No malarial parasites seen in thick and thin smears; history of having taken atabrin quite a good dose. All these were against it.

Alcoholic intoxication. Patient's friends and parents vouched that he was a complete teetotaler, never touched alcohol in his life. In addition this is a dry district and alcohol not easy to get. There was no smell of alcohol about him.

So in the end I was left with the affective disorder due to large dose of atabrin.

Treatment adopted.—Morphia gr. $\frac{1}{4}$ given immediately. As the patient had passed urine recently, no catheterization done. Lumbar puncture done—fluid under pressure, clear; no cells or leucocytes, no increase in globulin or albumin.

Blood for M.P. and leucocytosis—no M.P. and moderate leucocytosis. Feeding done through a nasal catheter passed into the stomach (intragastric drip). Nicotinic acid 4 tablets of 50 mg. crushed and dissolved in an ounce of water administered every 6 hourly. Orange juice with glucose, milk, barley water given.

Once paraldehyde with sugar solution given after about 6 hours. Patient had intervals of a few hours' rest.

The same treatment continued next day. The patient was slightly under control still. On the third day he was much better, and began taking interest in his surroundings. Took some milk by mouth and asked a number of reasonable questions. The convalescence was rapid and he became completely normal. He had 2,400 mg. of nicotinic acid in 3 days.

Subsequently I took the patient's blood pressure and examined his urine but could not find anything abnormal. He admitted to have consumed nearly 80 tablets of quinacrine within 30 days.

Therapeutic Notes

NOTES ON SOME REMEDIES

XI. ANTIMONY AND ITS DERIVATIVES (Part II)

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Therapeutic Uses

1. LEISHMANIASIS

1. *Kala-azar (visceral leishmaniasis).*—In this condition the pentavalent compounds are preferable, but in the following account tartar emetine has been included because it has the advantage of being a very cheap drug. For reasons of space only a few selected drugs are detailed below :

(1) *Antimonyl tartrates.*—The sodium salt is somewhat less toxic and irritant than the potassium salt, but both are used in the same manner and doses. A 2 per cent solution in sterile water or normal saline is prepared for the injection; it will keep for some weeks if 0.5 per cent carbolic acid is added, but before use it should be examined carefully to see that there is no precipitate. The initial dose in an adult is 2 c.c. and is increased by 1 c.c. at a time up to a maximum dosage of 5 c.c. Subsequently this 5 c.c. dose is repeated on each occasion. Great care is required to prevent any escape of the solution into the subcutaneous tissue; for if this accident happens, there will be a very painful swelling which sometimes results in sterile suppuration. In children from 10 to 15 years, the first dose is 1 c.c. increased to maximum 3.5 c.c., and in those under 10, the dose is increased from 0.5 c.c. to 2 c.c.

Of the toxic symptoms which follow the injection, the cough is not of much significance. Nausea is an indication against any further increase of the dose so long as it ensues, on the

other hand if there is vomiting, it is an indication for reducing slightly the next dose, increasing again when it ceases to appear.

The length of the course is usually determined by the time it takes to bring the temperature to normal; if this is unduly delayed, it will take longer time and greater amount of the drug to cure the disease. As a general rule, the maximum curative dose of the tartrates is 2.5 to 4 gm. for every 100 lb. of body weight, given in about 25 to 40 injections. The cure rate is about 80 per cent.

(2) *Neostibosan*.—Napier found this preparation the most efficient and least toxic of the pentavalent compounds. It is given intravenously in 5 per cent strength, the first dose being 0.2 gm. and subsequent doses 0.3 gm. The injections are preferably given daily, the total number of injections to effect a cure being about 12 (2.7 to 4 gm.). In children the drug is given intramuscularly in buttocks in 25 per cent strength and the dose is according to weight; the maximum dose being for 60 pounds or more, adult dose; 50 pounds, 0.25 gm.; 40 pounds, 0.2 gm.; 30 pounds, 0.15 gm. and 20 pounds, 0.1 gm.

(3) *Urea stibamine*.—It has been very extensively used in India. It is slightly more toxic than neostibosan and is given intravenously in 5 to 10 per cent strength on alternate days. The initial dose is 0.05 gm. which is increased by 0.05 gm. at a time up to maximum of 0.2 gm.; total dose 2 to 2.9 gm. in 12 to 15 injections.

(4) *Solustibosan*.—Napier, Chaudhuri and Rai Chaudhuri first used the Bayer 561 preparation issued in ampoules of sterile isotonic solution ready for injection intramuscularly and also intravenously. The initial dose was 2 c.c. and then 4 c.c. and 6 c.c. repeating the last dose till a total of 60 c.c. was reached for every 100 pound body weight. *Stibatine* (Glaxo) is now used in much larger doses, viz, 20 c.c. intramuscularly for 10 consecutive days—a total of 200 c.c. A concentrated preparation is also available, the course consisting of 10 daily intramuscular injections of 4 c.c. each.

Course of the disease under treatment

The response to treatment is not immediate in most cases. With a potent drug like neostibosan, the temperature usually comes down after 5 or 6 injections; with tartar emetic it may take about double that number or even more.

In some patients the temperature persists throughout the course of treatment. The weight may decrease at first. But after a fortnight the patient improves steadily, the spleen diminishes in size, the weight increases and the hæmoglobin value rises. A rise of the white blood cells above 6,000 per c.mm. is an important sign of recovery. The liver is more slow to return to normal in size, a spleen which is already hard cannot be expected to be normal again until some time elapses. The Leishman-Donovan bodies sometimes persist even after the last injection but disappear subsequently.

In some cases progress is slow, but eventually a cure is obtained unless they happen to belong to the resistant group. Coincident infections such as malaria, dysentery and ankylostomiasis are suitably treated. Complications are common in kala-azar, of these perhaps the most dangerous is cancrum oris which should be treated energetically with antimony and penicillin, the latter being given intramuscularly in 10,000 to 20,000 units three hourly for one week, and locally in 500 units per c.c. for two to three weeks.

Napier thus summarizes the effect of treatment in uncomplicated cases. If a full course of neostibosan or urea stibamine is given between the third and twelfth month of the disease, 90 to 95 per cent are cured, about 2 per cent die of some intercurrent disease during the course of treatment, and the rest relapse. Of those that relapse, about half to two-thirds are cured by subsequent treatment, but there remains a small residue of entirely resistant cases. The prognosis is not so good when the disease has lasted more than a year. The above observations apply to Indian kala-azar only. In China and in some of the Mediterranean areas the disease is much more resistant, while in the Sudan the response to antimony treatment even after a prolonged course is very poor indeed.

Post-kala-azar dermal leishmaniasis

This is a sequel to generalized leishmania infection, the dermal lesions appearing from one to two years after all signs of visceral disease have disappeared. The pentavalent compounds are not so effective as in visceral form of the disease, and in some cases better results are obtained with the trivalent compounds such as neoantimosan. The injections are given on alternate days. The nodular lesions respond better than hypopigmented ones. It may be necessary to repeat the course two or more times.

When the nodules are few, a 2 per cent solution of berberine sulphate may be locally injected; when very extensive, they become more susceptible to antimony if the patient is subjected to preliminary treatment with large doses of potassium iodide.

Resistant cases of kala-azar

The introduction of diamidino stilbine (stilbamidine) in recent years marks an advance in the treatment of kala-azar, but as it is liable to produce serious toxic effects, it should be reserved, in India at least, for antimony-resistant cases only. Though it does not contain any antimony, some details about it are recorded here.

The drug is a white powder, supplied in ampoules and is administered intravenously after being dissolved in 10 c.c. of distilled water (1 per cent solution). If exposed to light, the solution develops a toxic product, so it must be prepared just before the injection which is given very

slowly and on successive days. The initial dose is 0.025 gm. which is increased by 0.010 or 0.020 gm. according to reaction till a maximum of 1 milligramme per pound weight of patient is reached. If there is reaction after an injection the next dose is preceded by an injection of 0.25 c.c. of 1 in 1,000 adrenaline. In children who tolerate the drug better than adults, the first dose is 0.010 gm. increased by 0.005 gm. to a little over 1 milligramme per pound body weight.

After an injection of stilbamidine the patient becomes flushed with a burning sensation in chest and abdomen, and in severe cases there is intense headache with giddiness and sometimes vomiting and considerable fall in blood pressure; there may be even unconsciousness. These effects can be controlled by adrenaline injections. Some patients develop trigeminal neuropathy as a sequel to this therapy. Commonly three or four months after the completion of treatment the patient notices loss of sensation over his face, complaining, for instance, that he cannot feel a cigarette in his lips. Paræsthesia may follow.

No improvement usually takes place in the patient during the actual course of treatment; indeed, at first, it may cause exacerbation of the symptoms, but soon after the last injection the temperature falls to normal, the spleen decreases in size and the patient begins to put on weight. The drug has no effect on other forms of leishmaniasis.

As an alternative to stilbamidine, it is recommended to give in resistant cases three courses of neostibosan, each of twelve daily injections, at intervals of 12 days. The initial dose is 0.2 gm. which is increased by 0.1 gm. up to a maximum of 0.5 gm. daily; in the second and third courses the initial doses should be 0.3 gm. Instead of giving neostibosan alone, it may be given in combination with urea stibamine. If the former is not available urea stibamine or aminostiburia is used in usual doses. If there is little or no improvement after the first course, it is advisable to give during the second course one or two intravenous injections of T.A.B. vaccine or a few intramuscular injections of milk.

Assessment of cure

Of the laboratory tests culture of the blood or the material from spleen or sternum puncture is the most reliable method, but it is a slow method, and is possible only in a well-equipped hospital. Microscopic examination of the smears after the puncture is the next best way of ascertaining whether parasites have disappeared from the system, but it has its limitations. The aldehyde reaction is not of much value, as, though it becomes less evident, it persists three or four months after the patient has, to all external appearances, completely recovered.

The best evidence of cure is the absence of all symptoms of the disease during at least six

months following the course of treatment. 'The complete cessation of fever and its continued absence for a considerable time is of value if accompanied by a substantial gain in weight approaching nearly to the normal; disappearance of the spleen beneath the costal margin in cases in which it had not been enlarged much below the navel when treatment was commenced, or reduction by several inches when the organ was well below the level of the navel; and the disappearance of the leucopenia with increase of the total leucocytes to the normal number or more, a slight degree of leucocytosis being often seen in favourable cases' (Rogers).

2. *Oriental sore (cutaneous leishmaniasis).*—This is caused by local infection of the skin by *Leishmania tropica*, an organism similar to *L. donovani*, but antimony is not very satisfactory in this condition, the progress being very slow. A course of neostibosan or neostam is given commencing with 0.1 gm. and increasing on alternate days to 0.3 to 0.4 gm. Twelve injections are usually necessary. Urea stibamine may also be used as an alternative in usual doses. Trivalent compounds usually act better and of these foudadin (neoantimosan) or anthiomalin is recommended. About 10 intramuscular injections on alternate days are usually sufficient, the initial dose being 1.5 c.c. and the maximum dose 5 c.c. If there are single or a few early sores without ulceration local treatment with berberine sulphate (orisol) is recommended. One c.c. of a 2 per cent solution is injected at four or more points into the indurated area surrounding the ulcer. The injections are given only once a week, though 2 or 3 sores can be dealt with at one sitting. Three to six treatments are necessary to effect a cure. Emetine hydrochloride has also been reported to be effective in producing healing, 20 minims of a 5 per cent solution being injected into the thickened edges and bases of the ulcers. A 2 per cent solution of neostam has also been similarly used. These local injections are suitable only when a few lesions are present. They cause some local inflammation and should not be given for sores on the face. There are many other methods of treatment and actually a judicious combination will be found to give better results. In obstinate cases x-rays are sometimes useful. *Leishmania* vaccine (autogens or stock) is under trial and good results have been reported in some cases.

3. *American or muco-cutaneous leishmaniasis (espundia).*—The disease is almost entirely confined to Central and South America and is caused by *Leishmania brasiliensis* which is morphologically indistinguishable from *L. donovani* and *L. tropica*.

It was in this form of leishmaniasis that antimony was first used in 1911. In the place of antimonyl tartrates, the new compounds, e.g. neostibosan, foudadin, are now being used with satisfactory results. Besides, local cauterization has also been practised.

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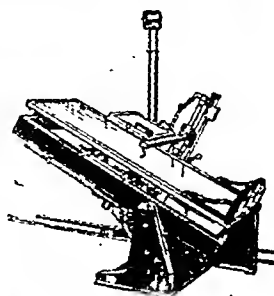
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Indian Medical Gazette

AUGUST

THE BLOOD TRANSFUSION SERVICE AND BLOOD BANKS IN INDIA

For the purpose of supplying suitable donors of blood for special cases in hospitals and nursing homes a blood transfusion service was commenced in Calcutta 23 years ago. Later, this service was enlarged. Later still a blood bank was opened. During World War II a serum bank for freeze-drying serum was added at a special cost for the needs of the armed forces. Similar institutions were established at Bombay, Madras, Lucknow, Patna, Lahore and Shillong. For the needs of the civil population elsewhere in India the arrangements obtaining in Calcutta prior to the serum bank will be described and the present-day requirements added.

The beginning.—A service of supplying donors of blood, after grouping and matching directly the bloods of the prospective donors and recipients, was started by Lieut.-Colonel R. B. Lloyd, the then Imperial Serologist, in his laboratory in Calcutta in 1924 (Greval, 1937). This was the first blood transfusion service in India. It was meant for a small number of patients. The donors were recruited from the European and Anglo-Indian communities only and the fee was rather high for those days (Rs. 50). A register of donors was maintained and a record of physical, serological and hæmatological examination before and after each service was kept.

The enlargement.—Lieut.-Colonel S. D. S. Greval (then Major) who followed Lieut.-Colonel Lloyd enlarged the service in 1935 by recruiting Indian donors as well. The fee then could be reduced in deserving cases. Further, donors of all blood groups could be selected more easily.

Easy availability of blood steadily increased the demand for blood in Calcutta. A still further enlargement was then effected in 1939 with a view to meeting this demand and making provision for national emergencies as well. The usual register and records were maintained and it is worthy of record that during seven years, 1934-41, no donor suffered in health due to donation of blood. This service supplied donors for 366 transfusions in 1940. The population served was of the order of two million.

The blood bank.—This service was started in 1939 by Lieut.-Colonel S. D. S. Greval to supplement the service of donors of blood. The total number of persons, in addition to the members of the Imperial Serologist's staff, who took part in the organization of the bank was 16. Out of them only three were whole-time workers paid

from a fund raised by the Bengal Red Cross Society. Total salaries were of the order of Rs. 1,700 a year. Total cost of the equipment was Rs. 1,100, recurring expenditure being Rs. 200 (Greval, 1939, 1940a, 1941; Greval and Chandra, 1941). This was the first blood bank in India.

Relations' or friends' blood found incompatible in grouping for one prospective recipient was taken in a bottle, kept in a refrigerator and given to another recipient of the same group. The latter's relations' or friends' blood was also taken and, if found compatible, given to the first prospective recipient. Whenever possible, for one blood supplied two bloods were taken as some bloods were discarded due to a positive or doubtful Wassermann reaction.

Later, public-spirited free donors were persuaded to call every six weeks or so to part with 400-500 c.c. of blood. They were put on a register and could be sent for specially, if necessary. Now three months is considered to be a safer interval.

New professional paid donors of the donors' service (who were sent to give blood on the spot in hospitals and nursing homes) also gave a bottle of blood free to the bank. This constituted a test of suitability as donors.

[Some donors are known to collapse after giving varying quantities of blood. For their benefit (i) ampoules of adrenaline chloride, 1 in 1,000, (ii) aromatic spirit of ammonia, and (iii) lemonade should be at hand.]

Blood was also bought from prisons (for a nominal fee of Rs. 5 plus rest for 2 days plus a remission in sentence).

Hæmatological observations were made on all bloods collected. Two facts used special mention: (1) Some donors' citrated blood did not show any visible change after several weeks' storage. This was observed repeatedly. (2) On the whole the specific gravity of the blood from the prisons was higher than that of the blood of the same community outside. This could only be accounted for by the balance in diet, rigidly attended to in prisons.

The blood was stored for not more than ten days in the beginning and for not more than seven days later. Mostly it was used within 3 days. It was stored by (i) communities and (ii) unlike the then London blood banks, by groups. Universal 'donors' bloods of two qualities depending on the titre of the iso(hæmagglutinin) and with a limit of 300 c.c. for the second quality were also available. They were kept in distinctive containers and could be issued at a moment's notice.

In the middle of 1941 about 200 donors of all classes could be bled for a national emergency every six weeks.

The plasma bank.—From blood remaining in storage longer than seven days plasma was separated and made safe for transfusion (*vide infra*).

The serum bank.—This was essentially a war-time establishment and would be rather a wasteful way of providing material for transfusion in peace time. Bloods were taken and allowed to clot. Clear sera were pooled, filtered and freeze-dried by special machinery.

The plasma, a by-product in a blood bank, can be dried like serum also and waste avoided.

The war-time dried serum stocks are still available in most countries. They are not likely to be replaced when expended.

Rhesus grouping.—The double blood transfusion service of pre-war Calcutta (donors, and bottled blood and plasma) can be easily established in all big towns in India where laboratory facilities exist. All the donors now, however, should also be rhesus-grouped. Most of the reactions due to the Rh incompatibility are due to the presence or absence of the antigen Rh₀ which can be detected by an animal serum (Grevall and Roy Chowdhury, 1946). Human testing sera so far have not been collected in India. American sera (kindly supplied by Dr. Wiener) have been used for special cases for several years in the Imperial Serologist's Laboratory, Calcutta.

If possible, Rh— subjects (by animal serum) should not be given whole blood at all, lest some rbc negative by the animal serum should be positive by human serum (*i.e.* contain Rh' and Rh" antigen). All Rh— subjects who have had a previous blood transfusion and all Rh— females who have borne children should have special attention paid to cross-matching test: the action of their sera on the rbc of the donor should be studied in a conglutination test after at least one hour's incubation. A prospective recipient Rh— by animal serum should, of course, never receive blood from a prospective donor Rh+ by animal serum.

(If human testing sera against Rh' and Rh" are available the correct sub-type can, of course, be determined and a whole blood transfusion given.)

Further, all \pm , doubtful, reactions by animal serum should be looked upon as negative in a recipient and as positive in a donor.

A subject ORh— (negative with human sera as well) with low isonin content has been considered safe all round. Such, however, is not the case. The donor may isoimmunize an Hr negative subject. The same observation applies to Rh— subjects of other groups for these groups. An Rh— donor should only be used for an Rh— recipient unless, of course, the exact type can be determined and the Hr incompatibility ruled out.

It has been suspected that there is a boost in blood transfusion (Albrecht, 1946). The boost should be discouraged. The plasma (subject to the restriction under the new danger of homologous serum jaundice) or serum (reconstituted from freeze-dried material) suffices in most cases.

Homologous serum jaundice.—The new danger of homologous serum jaundice (Editorial, 1947) introduces a risk in plasma transfusion like the risk of Rh incompatibility in whole blood transfusion. The risk really is greater inasmuch as it cannot be foretold. All donors with a history of jaundice must, of course, be excluded.

Probably protein hydrolysates will ultimately be found to be more suitable for intravenous alimentation than blood, serum or plasma.

When the rbc must be used, it should be possible to remove all traces of plasma from them (Editorial, *loc. cit.*).

Points in procedure: (1) *Collection of blood.*—A Potain's aspirator available in most hospitals in India suffices for an apparatus. The stopper carrying the essential parts fits an ordinary bottle quite well. In the bottle are sterilized as many c.c. of a 3 per cent solution of sodium citrate as multiplied by 10 give the total quantity of blood taken in the bottle (20 c.c. for 200, 30 for 300 and so on). Details were published in this journal (Grevall and Chandra, 1940). This method was redescribed later by other workers (Napier and Das Gupta, 1941; 1945). Recently a 2.0 to 2.5 per cent solution of disodium hydrogen citrate has been preferred. It does not char glucose if the latter is to be added for the preservation of the red blood cells (disodium hydrogen citrate 2.0 to 2.5 per cent 100 c.c. plus glucose 15 per cent 20 c.c., total 120 c.c., which is sufficient to prevent clotting in 400 to 420 c.c. of blood) and a slightly acid reaction of the mixture further aids the preservation (Maycock, 1947).

(2) *Preservation.*—The special stopper of the apparatus is replaced by an ordinary glass stopper with sterile precaution and the bottle after inscription (with Indian ink, covered with a layer of collodion) is left at room temperature to complete half an hour of this temperature. The blood left in the tube is preserved in two lots: (i) in sodium citrate solution for the red blood cells and (ii) in a dry tube for serum, for cross-matching the recipient. All the containers of blood are left in a refrigerator (one free from vibrations—electrolux—preferred) at about 4 to 8°C., the usual temperature outside the freezing chamber.

Blood preserved for less than a week is as useful as fresh blood, for most purposes (Grevall *et al.*, 1940). After a week its plasma should be collected and stored as a liquid up to 18 to 24 months or as a freeze-dried powder for at least 5 years (Maycock, *loc. cit.*). Preservation of the red blood corpuscles for longer periods, with the aid of glucose, is really not necessary for banking blood, although the method is used for keeping blood for experimental purposes and for the manufacture of anti-sera against certain hæmagglutinogens. Recently this method has been described again (Khanolkar, 1946).

Pooling of plasma from several donors of different groups makes it safe by lowering its isonin content. On the other hand, the virus of homologous serum jaundice is thus spread over a larger number of recipients. A mixture of two bottles from subjects A and B will yield a safe plasma as a rule (Greval, 1940b).

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Medical News

SCIENCE TO-DAY

THIS weekly publication is published by the Weekly Science Newsletter Ltd., 104, Clifton Hill, London, N.W.8. Its aim is to provide weekly a brief, but accurate, survey of contemporary advances in all branches of science. A. W. Haslett, M.A., is the editor. Subscription rates are 10s. a year (50 issues) or 5s. 6d for six months (25 issues).

Subjects which have so far been covered include the following:—

- New law of magnetism.
- Thorium and atomic energy.
- Research uses of rockets.
- Electronic calculators.
- Artificial rain.
- Cosmic radiation.
- Growth-control in plants.
- The chemistry of bacteria.
- Thirty million volt x-rays.
- Radioactivity and research.
- The structure of protein.
- Air navigation progress.
- Locust control.
- New chemical elements.
- Antarctic exploration.
- Future of radar techniques.
- Mountain building.
- Reflecting microscopes.

The 19th June, 1947, issue contains the following items: mountain building, the new radioactivity, Prof. Evans's visit in brief, strength of materials, books.

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Colleagues, if possible also biologists and physicists, are requested to give their names for holding lectures. A difference will be made between important communications, for which 20 to 30 minutes are allowed, and less important ones for which 5 to 10 minutes' time can be given. Those who will hold a lecture must also send their manuscripts to the main secretary's office, Weteringschans 73, Amsterdam, before the 15th April, 1948, at the latest, so that it can be taken up in the congress report.

PUNJAB MEDICAL COUNCIL

PROCEEDINGS of a meeting of the Punjab Medical Council held in the Committee Room of the office of the Director of Public Health, Punjab, Lahore, on Saturday, the 26th April, 1947, at 10 a.m.

Present

1. Lieut.-Colonel B. S. Nat, M.D., F.R.C.S., I.M.S., President.

Members

2. Dr. Abdul Hakim Khan, M.B., B.S.
3. Lieut.-Colonel Amir Chand, F.R.C.P.E., I.M.S. (Retd.).
4. Dr. Bikrama Jit Sahni, L.R.C.P. & S., D.P.H.
5. Dr. Kewal Ram Chaudhri, F.R.C.S.
6. Rai Bahadur Dr. Maharaj Krishna Kapur, C.B.E., L.M.S., D.P.H.
7. Lieut.-Colonel S. M. K. Mallick, M.R.C.P., D.P.H., I.M.S.
8. Rai Bahadur Dr. Mathra Dass, P.C.M.S. (Retd.).
9. Dr. Ch. Mohd. Nawaz, M.D. (Munich).
10. Captain Ram Chand Goulatia, M.B., B.S.
11. Khan Bahadur Dr. M. Yacob, D.P.H.
12. Lieut.-Colonel A. Sargood Fry, C.B.E., I.M.S.

Before transacting the business the following resolution moved by the President was carried all standing:—

(i) That this meeting of the Punjab Medical Council places on record their deep sense of grief on the sad demise of Khan Bahadur Dr. K. A. Rahman who was associated with this Council as a member for about 24 years.

(ii) That a copy of this resolution be forwarded to the members of the deceased family.

1. The proceedings of the last meeting held on the 30th November, 1946, were confirmed.

2. Election of the Vice-President.

Dr. K. R. Chaudhri proposed and Dr. Ch. Mohd. Nawaz seconded that Captain Ram Chand Goulatia be elected as Vice-President of the Punjab Medical Council.

Though there was no other proposal a ballot was taken as required under the rules and as all the votes were in the affirmative Captain Ram Chand was declared unanimously elected as Vice-President of the Punjab Medical Council.

3. Election of members on the Executive Committee.

Dr. K. R. Chaudhri proposed and Captain Ram Chand Goulatia seconded that Dr. Ch. Mohd. Nawaz be elected as a member of the Executive Committee.

Lieut.-Colonel Mallick proposed and Khan Bahadur Dr. M. Yacob seconded that Dr. Vishwa Nath be elected as a member of the Executive Committee.

As there was no other proposal Dr. Ch. Mohd. Nawaz and Dr. Vishwa Nath were declared elected to the Executive Committee.

4. Election of a representative of the Punjab Medical Council on the Governing Body of the Punjab State Medical Faculty.

Dr. B. J. Sahni proposed and Dr. K. R. Chaudhri seconded that Lieut.-Colonel Amir Chand be elected as a representative of the Punjab Medical Council on the Governing Body of the Punjab State Medical Faculty.

Lieut.-Colonel Mallick proposed and Lieut.-Colonel A. Sargood Fry seconded that Dr. Vishwa Nath be elected as a representative of the Punjab Medical Council on the Governing Body of the Punjab State Medical Faculty.

In favour of the proposal of Dr. B. J. Sahni, 6.

In favour of the proposal of Lieut.-Colonel Mallick, 5.

Lieut.-Colonel Amir Chand was declared elected as a representative of the Punjab Medical Council on the Governing Body of the Punjab State Medical Faculty.

5. Considered the case of Dr. Ahmad Sadiq, M.B., B.S., for the grant of a yellow fever inoculation certificate. In this connection considered the request of Dr. Ahmad Sadiq for postponing the consideration of his case.

Resolved that the case of Dr. Ahmad Sadiq be postponed for consideration at the next meeting of the Punjab Medical Council.

6. Considered the case of Dr. Kirpa Ram Sud, M.B., B.S., Simla, for advertising, and in this connection also considered the request of Dr. Kirpa Ram Sud for postponing the consideration of his case.

Resolved that the case of Dr. Kirpa Ram Sud be postponed for consideration at the next meeting of the Punjab Medical Council.

7. Considered letter no. 8898-M-46/1838, dated the 23rd January, 1947, from the Punjab Government, re. amendment of rule 46.

Resolved that the Council approves the amendment suggested by Government.

8. Considered letter no. HCM2883/47, dated the 22nd January, 1947, from the Registrar, Madras Medical Council, re. composition of the Medical Council of India.

Resolved that the Central Government be requested to suitably amend the Indian Medical Council Act so as to make provision for an elected representative of each of the Provincial Medical Councils in India to serve on the Medical Council of India.

9. Considered the recommendations of the Executive Committee held on the 12th April, 1947 (already circulated).

Resolved that the recommendations of the Executive Committee at items nos. 1 to 3, 5 to 7 and 9 be approved.

Item no. 4. Resolved that a reference be made to the General Medical Council that Dr. B. S. Jain, who held the triple qualifications of L.R.C.P. & S. (Edin.) and L.R.F.P. & S. (Glasgow), and who was deprived of the qualifications of L.R.F.P. & S. (Glasgow) on account of his name having been removed from the Register of the General Medical Council, is still entitled to be registered in the Register of the General Medical Council with the qualifications of L.R.C.P. & S. (Edin.) in case the General Medical Council decides to restore his name.

(ii) That the date on which he was deprived of the qualification of L.R.F.P. & S. (Glasgow) be ascertained from the Secretary of the Royal Faculty of Physicians and Surgeons (Glasgow).

Item no. 8. Resolved that Dr. Chanan Singh Mann be informed that in view of his past conduct the Council is not prepared to restore his name to the Punjab Medical Register.

10. Punjab Government letter no. 1812-M-47/8738, dated the 9th April, 1947, regarding the amendment of the Punjab Medical Registration Act was read and recorded.

11. Considered the statement of income and expenditure for the year 1946.

Resolved that the statement of income and expenditure for the year 1946 be approved.

Sd./- HANS RAJ,
Registrar,
Punjab Medical Council.

Sd./- B. S. NAT,
LIEUTENANT-COLONEL, I.M.S.,
President,
Punjab Medical Council.

STREPTOMYCIN

(Abstracted from a letter dated 22nd March, 1947, from the London correspondent to the J.A.M.A., published in the 10th May, 1947, issue, p. 204)

AMERICAN reports have raised high hopes of the value of streptomycin. The Ministry of Health has issued a warning on the subject, stating that trials are being carried out by the Medical Research Council, and until these have been completed it is not possible to assess the value of the drug and to determine the best methods of use. The latest American reports are regarded as indicating that the value of streptomycin in tuberculosis is still unproved. While the Minister of Health does not wish to hamper doctors and hospitals in their endeavours to obtain new drugs which may benefit their patients, he emphasizes that streptomycin is potentially dangerous and may cause ill effects such as giddiness and deafness. Insufficient is known about the drug at present to justify the government in making it more freely available. For instance, in a very small number of patients with tuberculous meningitis whose life has been prolonged by the treatment there has nearly always been permanent serious mental derangement, blindness or deafness.

CAMPAIGN AGAINST TUBERCULOSIS IN AUSTRALIA

According to a 'Medical Memoranda' item in the *British Medical Journal*, 31st May, 1947, page 765, the Australian Government has started a campaign against tuberculosis and appointed Dr. Harry Wenderly as Director of Tuberculosis. The Commonwealth Government has granted £250,000 for payment to sufferers from the disease and their dependants.

YOU CAN . . . RAISE BABY BY MAIL IN AUSTRALIA

By BOYD DAVIES

(Reproduced from Release No. P/639, offered by the Public Relations Officer, Australian High Commissioner's Office, New Delhi)

In addition to correspondence schools conducted by State Departments of Education to give education to 'outback' children, Australia has pioneered the mails as a means of bringing scientific care and health to many isolated children in their first crucial years.

By this correspondence system, many Australian mothers, miles from the nearest doctor, are successfully rearing their babies. The scheme applies mainly to South Australia, and this is one of the reasons given for the State's low infant mortality rate.

For the year ended December 1946, only 27.07 babies in every 1,000 born there did not live to one year. This was not only the lowest infant death rate of anywhere in the Commonwealth of Australia (except the sparsely settled Northern Territory), but was lower than that of any sovereign State in the world. The 1944 figure for the State was 29.07.

1,700 'Subscribers'

Behind the novel 'Mail Baby' project is the Mothers' and Babies' Health Association of South

Australia, which now supplies regular written lectures to mothers in the State and to isolated areas throughout Australia's 3,000,000 square miles.

Mothers in Western Australia, Darwin, New Guinea and on solitary lighthouses are among the 1,700 who are bringing up 'Mail' babies.

For these isolated women, help takes the form of 'lectures', including instructions on the correct diet and exercise for mother and baby, general health problems, childhood ailments, and hints on suitable baby clothing. These hints, doctors say, have helped many a baby safely through the first and second years.

Sister Nora Godlee, who is in charge of the correspondence section of the Mothers' and Babies' Health Association, studies the case of each child individually, and applies her intimate knowledge of early childhood problems.

Service by Train

If mothers live in small country towns, trained sisters of the M.B.H.A. offer advice personally, and watch the health of growing babies during regular periodical visits.

Country towns over a wide area of South Australia have their own clinics and there are 161 in all, but to assist even the most isolated mother the M.B.H.A. runs two special trains, staffed by double- and triple-certificated sisters. The schedule of these trains is advertised in all country newspapers and broadcast over all metropolitan and provincial radio stations. The trains, drawn free by the South Australian Railways, are sidetracked at selected spots for several days, until all mothers within a radius of 50 miles have had an opportunity of receiving the free advice offered by the train staff.

Pre-natal Care

The work of this Government-subsidized organization does not lie solely in post-natal care, but also caters for the expectant mother.

Whenever possible the mother-to-be receives highly specialized pre-natal care at any of the dozens of hospitals in South Australia or from her own family doctor.

A specialist at South Australia's largest maternity hospital (the Queen Victoria) said recently that although South Australia's infant mortality rate stood at 180 in the thousand in 1875, little was done about scientifically reducing the loss until 1920.

At the end of the last century babies were often born in the mother's home, and if facilities were lacking or birth was difficult, the lives of both mother and infant were endangered.

Sometimes in poorer areas babies are still born in the home, with the doctor called in at the last moment. But in the overwhelming majority of cases doctors study each expectant mother months before the baby is due, and order a hospital confinement.

In the normal course of events, the expectant mother reports to the hospital five months before the baby is due and receives instructions about correct diet and general hygiene.

Any abnormalities are determined by x-rays, and doctors examine the woman to see if she has tuberculosis, a heart disease or anything which could be passed on to the baby.

If what the doctors call the incompatible Rh factor—a blood condition—is present, deaths are reduced by a blood transfusion given to the baby immediately after its birth.

Although safe painless birth for all is still far off in Australia as elsewhere, the latest sedatives are used and play their part in reducing shock and worry to the mother and giving baby a better chance of a normal birth.

Glassed-in nurseries minimize the risk of infection after birth, and babies are handled as little as possible.

Washing Reduced

It was recently found that the risk of infection to newly-born babies was cut by giving them fewer baths, and in many Australian hospitals doctors avoid the

risk of infecting the youngsters by ordering only two baths—one immediately after birth and the other just before the mother leaves hospital to take her baby home. Babies are cleaned with frequent oil spongings.

Doctors point out that premature births will probably always lead to some deaths among babies, and that no country is likely ever to have an infant death rate of nil. But this is no discouragement to the struggle by Australians to get 'as near to nil as possible'.

TEMPORARY SURGICAL CAMPS

It is notified for information of medical practitioners that the attention of this Council has been drawn to the inadequacy of after-care arrangements at Temporary Surgical Camps organized by medical men and they are requested to note that any negligence in this respect will be taken serious notice of by this Council.

By order

Registrar,
Bombay Medical Council.

YELLOW FEVER VACCINE INJECTIONS

MEDICAL practitioners are reminded of the orders of the Government of India, viz, that yellow fever vaccine is available only at Government institutions and they are therefore advised that it is improper for medical practitioners to give injections against yellow fever even though vaccine may be supplied by their patients, as it is very likely that such vaccine is either 'not genuine' or 'is such as has fallen into wrong hands'.

Registrar,
Bombay Medical Council.

K. R. K. IYENGAR, M.B.E., C.I.E., M.D. (Edin.),
D.P.H. (Lond.)

LIEUTENANT-COLONEL, I.M.S. (Retd.)

LIEUT.-COLONEL IYENGAR passed away after prolonged illness at his residence 'Shelwood' on the midnight of Sunday, 20th July, 1947, at the age of 65.

Colonel Iyengar was born in 1883. He was educated at the Central College, Bangalore, and at the University of Edinburgh where he obtained M.B., Ch.B. in 1908 and M.D. with Honours in 1926. He also obtained the D.P.H. (Lond.) in 1910.

Colonel Iyengar was in the Mysore State Medical Service from 1911 to 1914. He joined the Medical Research Department and worked at the Central Research Institute, Kasauli, from 1914 to 1928 except for two years 1924-1926 when he was on military duty. He joined the I.M.S. in 1921. He was appointed Director, Pasteur Institute of Southern India, Coonoor, in 1928 in which post he continued till his retirement in 1938. He held the post again from 1941 to 1946.

His contributions to science include 26 publications on the Wassermann reaction and its results in malaria, tuberculosis, kala-azar, etc., on problems in immunization with vaccines and on rabies. He was elected president of the Medical and Veterinary Section of the Indian Science Congress in 1935 and his address to the congress was on 'Rabies'.

Colonel Iyengar was awarded the Research Worker's medal and the honour of O.B.E. in 1939 and C.I.E. in 1945.

He was the founder-president of the Nilgiris Rotary Club 1942 and was elected District Governor of the South India Rotary Clubs in 1943; also president of the Coonoor Club and Freemason—Worshipful Master of the Anchor of Hope Lodge, Wellington. He carried on vigorous war propaganda as president of the District War Propaganda Committee from 1939 to 1945. He was a very keen horticulturist and has made the Coonoor Pasteur Institute Gardens one of the finest in the Nilgiris.

Colonel Iyengar leaves behind him his wife Usha Iyengar, the second daughter of late Lieut.-Colonel N. P. Sinha, r.m.s., elder brother of the first Lord Sinha, three daughters and two sons, and a very large circle of relatives and friends to bemoan his loss.

Public Health Section

OBSERVATIONS ON ANÆMIA IN THE MALNAD PARTS OF THE MYSORE STATE

By N. A. AIENGAR, L.R.C.P., M.R.C.S.

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THE State of Mysore is divided roughly into two areas—the Malnad and the Maidan. The former comprises of parts of the districts of Shimoga, Kadur, Hassan and Mysore. The so-called Malnad area skirts the Western Ghats all along, studded with well-wooded evergreen forests; the rainfall ranges from 35 inches to an average of 360 inches. Last year, i.e. 1946, one of the places recorded 580 inches. This paper is based mainly on the observations made in the Shimoga district and its neighbouring taluks of Kadur district and part of Hassan district. The conditions in a similar area of the Mysore district are said to be very much better than in any other district and so nothing is said of that area. The first observation by one of the authors (N. A. A.) was made in the years 1940 and 1941, when he was stationed at Hassan. Cases of extreme anæmia with enlargements of spleen complicated with ankylostomiasis were noticed taking resort to the hospital. At that time not much enquiry was made into the causation of this condition beyond considering the curing of the patients. The two taluks, Belur and Saklespur, of Hassan district in addition to having well-wooded hills and valleys have plantations of coffee, orange, cardamom and paddy fields. In Kadur district too the conditions are alike; whereas in Shimoga district one finds more of areca-nut gardens and paddy fields. The ghat area rises up to 5,000 feet and there are deep valleys in between. During the monsoon weather plenty of hill-streams and torrents rapidly flow along, dividing and cutting off villages from external contact. During summer there is not a drop of water in many places. The rainy weather lasts from the middle of June till the middle of October. Roads are few and are of a very primitive character, with the exception of the provincial roads and a few fairweather District Board roads. It is bad enough during summer to transport either people or material; it is impossible in the rainy weather; some places become temporary islands for 3 months in the

year. Since the year 1943 up till now on an average 500 cases of anæmia of an extreme degree have come for treatment to the McGann Hospital, Shimoga, every year. This constant flow of these cases every day attracted our attention. Whatever the cases were, whether acute, chronic, surgical or medical, they were complicated with ankylostomiasis which made the recovery difficult. Owing to conditions of war that existed in the major part of these years for want of sufficient staff and equipment very many details could not be worked out; besides, the extremely poor condition of the patients made it practically impossible to carry out all the necessary investigations. Anything was a torture and anything might kill them. This year the investigations were carried on in a better fashion in 50 cases. As a routine in all the 2,000 cases blood counts were made, percentages of hæmoglobin calculated, and the stools and blood were examined for parasites. Amongst women patients pregnancy added to the complication and made it worse. At one time it was thought that transfusion of blood might improve matters. To our disappointment it did not help much. During these trials it was a problem to get donors. Every second person that one could place one's finger on was anæmic and could not afford to lose any blood; and whenever a willing fit donor was found, these extremely anæmic bloods never matched. In one or two cases we persisted trying to find a suitable donor and patiently cross matched as many as 50 bloods and not one was compatible. Plasma also was tried but with disappointing results. It appears that their system is already water-logged and cannot tolerate any further fluid intake. It is not the quantity that one has got to think of in these cases, but it is the improvement of the quality. We have no facilities to transfuse concentrated R.B.Cs. As a next step we tried injecting blood intramuscularly. In some cases it did give a response to a certain degree; patients that were chalky white soon got a darker hue about them and gave a chance for further treatment with liver and iron. It is surprising to see people walk into the clinic with as low a blood count as $3\frac{1}{2}$ lakhs per c.mm. and hæmoglobin about 12 per cent. It is true they are beyond all chances of recovery; but yet they are alive. The table just gives an idea as to the blood counts, colour index and other details and also the percentage of low blood counts that were found in these 33 cases which will be a fair indication of the other cases.

General examination.—The patients are extremely ill, highly anæmic with hollow sunken pale eyes, puffed out cheeks and pot bellies. Their limbs are just like sticks hanging from

TABLE

The figures below show the total R.B.C. count of each of the 33 patients among men and women in the years 1945 and 1946

Total R.B.C. count in terms of millions

	Below 1		1 to 1		1 to 1½		1½ to 2		2 to 2½		2½ to 3		3 to 3½		3½ to 4		4 to 4½		4½ to 5		Above 5		Total
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	
1945	3	..	25	51	20	56	33	29	19	28	34	27	20	28	18	18	18	24	22	10	8	1	492
1946	2	..	20	37	35	56	26	21	35	25	38	15	30	15	28	18	27	11	15	3	8	1	466

The above figures show that on an average 500 cases are admitted into this hospital for the treatment of anæmia.

The table below shows 33 cases worked out in the available details from the limited staff and materials.

TABLE—contd.

Case number	Age	Sex			Stools	Urine	Gastric analysis
1	23	F.	Pregnancy 7½ months, III para, spleen +.	R.B.C. 1.5, Hb. 20%, C.I. 0.7, B.P. normocytic hypochromic, W.B.C. 4,200, D.C. poly 52%, eosino 6%, lympho 40%, large mono 2%.	Ankylostoma ova +.	Normal	..
2	20	F.	Pregnancy 8 months, II para, spleen ++.	R.B.C. 0.86 million, Hb. 10%, C.I. 0.6, B.P. moderate anisocytosis, W.B.C. 2,600, poly 43%, eosino 7%, lympho 50%, no megaloblasts. Normocytes predominant.	Do.	Albumin ++.	..
3	24	F.	Pregnancy 7 months, V para, spleen +.	R.B.C. 0.92, Hb. 15%, C.I. 0.8, B.P. normocytic hypochromic, W.B.C. 3,000, D.C. poly 45%, eosino 6%, lympho 47%, large mono 2%.	Roundworm ova +.	Normal	..
4	50	M.	Fever since 3 months, spleen +++.	R.B.C. 2.48, Hb. 30, C.I. 0.6, B.P. normocytic hypochromic, W.B.C. 3,200, poly 35%, eosino 10%, large mono 5%, lympho 50%.	Roundworm ova, ankylostoma ova +.	Do.	Normal
5	23	M.	Dysentery and fever 6 months, spleen —.	R.B.C. 1.56, Hb. 35, C.I. 1.1, B.P. normoblasts, normocytes predominant. W.B.C. 5,700, poly 51%, eosino 7%, large mono 3%, lympho 39%.	Ankylostoma and roundworm ova +.	Do.	No free HCl in the fasting sample, rest normal.
6	30	M.	Fever 2 months, spleen +++.	R.B.C. 1.42, Hb. 25, C.I. 9, B.P. normocytic hypochromic, W.B.C. 4,400, poly 55%, eosino 6%, large mono 2%, lympho 37%.	Roundworm ova +.	Do.	Tendency for hyperchlorhydria.
7	20	F.	Pregnancy 7½ months, I para, general œdema.	R.B.C. 1.06, Hb. 15, C.I. 0.75, B.P. normocytic hypochromic, W.B.C. 12,400, poly 45%, eosino 7%, large mono 3%, lympho 45%.	No cyst. no ova.	Albumin +.	..
8	22	F.	Pregnancy 6½ months, II para, spleen +++.	R.B.C. 1.28, Hb. 15, C.I. 0.6, B.P. hypochromic microcytic anæmia, W.B.C. 2,800, poly 49%, lympho 32%, eosino 13%, large mono 6%.	Ankylostoma and roundworm ova +.	Normal	..
9	25	F.	Pregnancy 7 months, II para, spleen ++.	R.B.C. 1.32, Hb. 20, C.I. 0.8, B.P. hypochromic anæmia, W.B.C. 4,100, poly 50%, lympho 39%, eosino 9%, large mono 2%.	<i>E. histolytica</i> cyst +.	Do.	..

The above may be taken as examples of usual types of anæmia met with in these parts.

TABLE—contd.

Case number	Age	Sex			Stools	Urine	Gastric analysis
10	18	F.	Pregnancy 6 months, I para, spleen +.	R.B.C. 1 million, Hb. 20, C.I. 1.0, B.P. normoblasts a few, normocytic hypochromic.	Normal	Do.	..
11	24	F.	Pregnancy 5 months, spleen —.	R.B.C. 1 million, Hb. 20, C.I. 1.0, B.P. normocytic anaemia, W.B.C. 6,000, D.C. poly 62%, lympho 38%.	Do.	Do.	..
12	20	F.	Malaria 1 month, spleen +.	R.B.C. 2.15, Hb. 25, C.I. 0.6, W.B.C. 4,600, poly 55%, lympho 38%, B.P. microcytic hypochromic anaemia, eosino 3%, large mono 4%.	Roundworm ova ++.	Do.	..
13	20	F.	Pregnancy 6 months, I para, spleen ++.	R.B.C. 1.58, Hb. 35, C.I. 1.09, B.P. hypochromic anaemia, W.B.C. 4,200, poly 52%, lympho 40%, eosino 4%, large mono 4%.	Normal	Do.	..
14	30	F.	Pain in the chest and abdomen, spleen +.	R.B.C. 0.98, Hb. 25, C.I. 1.25, W.B.C. 6,400, poly 56%, eosino 6%, lympho 38%, B.P. normocytic anaemia, a few megaloblasts and normoblasts. normocytes predominant.	<i>E. histolytica</i> cysts +, roundworm ova +.	Albumin +.	..
15	26	F.	Dysmenorrhœa, spleen +++.	R.B.C. 0.54, Hb. 15, C.I. 1.36, W.B.C. 4,000, poly 60%, lympho 35%, eosino 3%, large mono 2%, B.P. normocytic anaemia, a few normoblasts seen.	Ankylostoma ova +.	Normal	..
16	30	F.	Fever since 3 months, spleen +++.	R.B.C. 2.3, Hb. 45, C.I. 0.98, W.B.C. 4,600, poly 48%, lympho 38%, eosino 14%, B.P. microcytic anaemia.	Normal	Normal	..
17	28	F.	Pregnancy 6 months, spleen ++.	R.B.C. 1.7, Hb. 25, C.I. 0.73, W.B.C. 6,500, poly 52%, lympho 34%, eosino 14%, B.P. normocytic anaemia.	Roundworm ova +.	Do.	..
18	25	F.	Pregnancy 6 months, III para, spleen ++, dysentery 15 days.	R.B.C. 2.8, Hb. 25, C.I. 0.44, W.B.C. 5,000, poly 63%, lympho 30%, eosino 3%, large mono 4%, B.P. marked hypochromic microcytic anaemia.	<i>E. histolytica</i> cysts ++.	Do.	..
19	38	F.	Spleen +.	R.B.C. 0.84, Hb. 25, C.I. 1.5, W.B.C. 4,800, poly 66%, lympho 32%, eosino 2%, B.P. normocytic anaemia.	Ankylostoma ova +.	Albumin traces.	..
20	38	M.	Fever 3 months, spleen +++.	R.B.C. 1.25, Hb. 30, C.I. 1.2, W.B.C. 6,200, poly 48%, eosino 7%, large mono 2%, lympho 43%, B.P. normocytic hypochromic.	Do.	Normal	No free HCl in the fasting sample. The rest tendency for hyperchlorhydria.
21	35	M.	Spleen +.	R.B.C. 0.82, Hb. 15, C.I. 0.9, W.B.C. 3,200, poly 52%, lympho 38%, eosino 6%, large mono 4%, B.P. microcytic anaemia.	Do.	Do.	No free HCl in the fasting sample. The rest normal.
22	50	M.	General weakness and breathlessness since 3 months.	R.B.C. 4.18, Hb. 65, C.I. 0.8, W.B.C. 3,800, poly 62%, eosino 4%, large mono 2%, lympho 32%, B.P. hyperchromic anaemia of a moderate degree.	Normal	Do.	..
23	48	M.	General weakness and breathlessness.	R.B.C. 1.2, Hb. 35, C.I. 1.46, W.B.C. 5,000, poly 65%, lympho 33%, large mono 2%, B.P. normocytic anaemia, normoblasts—a few, no megaloblasts.	Do.	Do.	..

The above may be taken as examples of usual types of anaemia met with in these parts.

TABLE—concl'd.

Case number	Age	Sex			Stools	Urine	Gastric analysis
24	45	M.	Spleen +++.	R.B.C. 1.02, Hb. 15, C.I. 0.75, W.B.C. 5,200, poly 58%, eosino 6%, large mono 4%, lympho 32%, B.P. microcytic anæmia.	Ankylostoma ova +.	Albumin traces.	Normal curve.
25	17	M.	Do.	R.B.C. 3.28, Hb. 40, C.I. 0.61, W.B.C. 6,200, poly 62%, eosino 4%, large mono 2%, lympho 32%, B.P. normocytic anæmia.	Do.	Normal	..
26	25	F.	Dysentery, pregnancy 5 months, V para, spleen ++.	R.B.C. 0.97, Hb. 15, C.I. 0.78, W.B.C. 6,800, poly 60%, lympho 36%, eosino 1%, large mono 3%, B.P. normocytic anæmia.	<i>E. histolytica</i> cyst, roundworm, and ankylostoma ova +.	Do.	..
27	30	F.	Pregnancy 4 months, spleen +++.	R.B.C. 1.25, Hb. 25, C.I. 1.0, W.B.C. 7,800, poly 49%, lympho 42%, eosino 5%, large mono 4%, B.P. normocytic anæmia.	Ankylostoma ova +.	Albumin traces.	..
28	20	F.	Pregnancy 7 months, spleen ++.	R.B.C. 1.08, Hb. 20, C.I. 0.9, W.B.C. 3,400, poly 46%, eosino 5%, large mono 1%, lympho 48%, B.P. normocytic anæmia.	Do.	Normal	No free HCl in the fasting sample. The rest normal.
29	25	F.	Pregnancy, IV para, swelling of the hands and feet.	R.B.C. 0.85, Hb. 20, C.I. 1.18, W.B.C. 6,200, poly 53%, lympho 40%, eosino 3%, large mono 4%, B.P. normocytic anæmia. A few normoblasts seen.	Normal	Do.	..
30	22	F.	Pregnancy 8½ months, spleen +.	R.B.C. 1.6, Hb. 20, C.I. 0.6, W.B.C. 4,700, poly 46%, large mono 6%, eosino 10%, lympho 38%, B.P. microcytic anæmia.	Roundworm ova +.	Do.	..
31	25	M.	Spleen ++.	R.B.C. 1.4, Hb. 30, C.I. 1.07, W.B.C. 2,400, poly 75%, large mono 1%, lympho 24%, B.P. normocytic anæmia.	Ankylostoma ova +.	Do.	No free HCl in the fasting sample. The rest normal.
32	30	M.	Spleen ++, dermatitis, liver ±.	R.B.C. 750,000, Hb. 20, C.I. 1.3, W.B.C. 4,000, poly 58%, lympho 38%, eosino 2%, large mono 2%, B.P. no megablasts, normocytic anæmia.	Ankylostoma and roundworm ova +.	Do.	Do.
33	38	F.	Puffiness of the face and oedema of the feet, liver ±, spleen ±.	R.B.C. 840,000, Hb. 25, C.I. 1.4, W.B.C. 4,800, poly 60%, lympho 34%, eosino 6%, B.P. normocytic anæmia, a few normoblasts.	Ankylostoma ova +.	Do.	Both total and free HCl, much higher than normal.

The above may be taken as examples of usual types of anæmia met with in these parts.

the body. They are short of breath and with some difficulty they do walk along into the clinic. In some there is general anasarca. In such cases the abdomen, the feet and the cheek are swollen up. The spleen is enlarged to a very great extent occupying almost the whole of the abdomen, including the pelvis even. The spleen takes different shapes, in some cases lengthens like a ploughshare (see plate XVII). The liver is enlarged in many cases. The heart invariably shows myocardial degeneration. The patients show certain amount of congestion of the lungs. The skin is dry—dermatitis, sores and ulcers are found. These ulcers start as small pimples on the lower extremities and before the

end of a week they occupy a large area. They are indolent, callous, pale and chronic; in some cases as old as a couple of years (see plate XVII).

Apart from malaria and helminthic infections, which are the causative factors, the extremely poor condition of these patients is, due to neglect on their part, due to economic reasons and ignorance.

Hæmatological findings.—From the above figures it is noted that 16 per cent of cases show a total R.B.C. count of less than one million. Between 1 to 1½ million the percentage works out at 15 per cent. The percentage of women is greater than that of men. Amongst women even anæmias of pregnancy are included.

The colour index in these low count cases is more often above one. The details are :—

1. *Size and shape of R.B.C.*—Most of these cases show a vacuolated normocyte. In some, microcytes and normoblasts are found. No megaloblasts were seen. All the cases showed a certain degree of anisocytosis but normoblasts were predominant.

2. *W.B.C.*—Between 2,400 to 6,000 per c.mm. is the usual count.

3. *Differential count.*—There is a slight increase in the eosinophils in most of the cases.

Stools.—Most cases show ankylostoma ova, roundworm ova and *Entamoeba histolytica* or cysts. Some specimens showed the presence of more than one type of helminthic infection. No *Tania* of any sort was noted.

Urine.—Only a few cases showed the presence of albumin.

Gastric analysis.—Owing to the extremely delicate conditions of the patients, the gastric juices of only 10 patients from the above list were examined. It is concluded that most of them showed either a normal hydrochloric acid content or showed a tendency for hyperchlorhydria. In no case hypochlorhydria was noticed.

Radiological findings.—Photographs of 4 cases are shown in plate XVII. Only a few cases, viz, eight, were examined, since the patients could not tolerate even a barium meal examination under fluoroscopy owing to tendency to vomiting. They could not take more than 4 oz. at a time. It is seen from the pictures that the stomachs are extraordinarily small and in all the 4 cases they are more or less tubular and spasmodic. They showed a tendency towards hyperactivity after release of the spasm. The spasm disappeared after a time in some.

Some 200 years ago in this very same area prospered a kingdom known as Bidanur. Bidanur, the capital city now known as Nagar after its conquest by Hyder Ali, had, it is said, a population of 5 lakhs. There were different nationalities : Chinese, Portuguese, French, English, Mahrattas, Mohammedans and the local Hindu population. Even now the ruins remain. This Nagar to-day has not a population of five hundred. It is a desolate dilapidated village. A scion of one of the ancient families is trying to bring it into some shape. This place is right at the head of the ghat with thick forests all round and the rainfall is about 200 inches per year. The villages round about are no more than little hamlets of one or two houses and a few thatched huts. In some villages one finds only a single house. The population is declining. In some villages comprising one house and its lands there are just two people and probably one of them may be ill. For a population of 5 lakhs in a town to exist with prosperous villages all round, there must have been some sort of a system in those days to render these places healthy. In the wake of

war and destruction the civilization that existed then dwindled; the system then was soon forgotten; the new methods of another civilization did not suit; desolation set in.

Nutrition.—The food of the average farm labourer is very poor; it is protein and fat-free. He just lives on rice boiled or made into a conjee; he does not know what dhal or milk is like. From childhood he has not tasted milk either human or otherwise. Women die either during pregnancy or during labour or soon after it. Maternal mortality is very high. For want of milk, children are brought upon rice conjee from early infancy. Most of them are vegetarians but they do not even consume vegetables. They may have a chilli or an onion. Even the non-vegetarians by virtue of necessity have become vegetarians. Beyond occasionally having some game or some meat when available, when a sheep is slaughtered once in a way, or some fish during season, they mainly live on rice or rice conjee. On the outskirts of the Malnad some Goulics rear herds of buffaloes in the forest. They do not sell milk or buttermilk. They just get the butter out and the rest is given back to the animals. As one goes interior, the cattle are miserable specimens. They are small in stature, as big as a full-grown sheep. Their yield is very poor; about a *pau* or less of milk per head is all that one can get and that during the rainy season when there is some jungle fodder available. During summer they feed on any refuse and even faecal matter. These cattle are maintained more for providing manure than milk.

Owing to disease and ill health the farmer does not start his day's work before 9 a.m. Within a couple of hours the sun is up and the day gets too hot. He gets his usual rigor and fever and for the rest of the day he is bed-ridden and useless; so, economically, he is a loss and a drag on the family and the country. His working capacity is reduced to a very low level. Nature is bountiful and kind to him. Without much labour he gets one crop annually : it is the rainy season crop. His methods of agriculture are primitive. In these parts one can manage to raise at least two crops in the year easily. Owing to depopulation labour is not available. What labour is available comes from the west coast during the seasons only. As a result much of the arable land is left fallow.

Treatment.—The usual treatment followed in these cases at this hospital is firstly attention to diet. Such of those as are meat-eaters are given a mixed diet consisting of eggs, bread, butter and coffee in the morning; meat curry and rice in the afternoon; and at night a vegetable curry and either chapatti or rice. In addition they also get two pints of milk per day. As for pure vegetarians egg is served in the shape of flip; bread, butter and coffee in the morning, vegetable curry and rice in the afternoon, and chapatti and vegetable curry in the night. They are also given two pints of milk

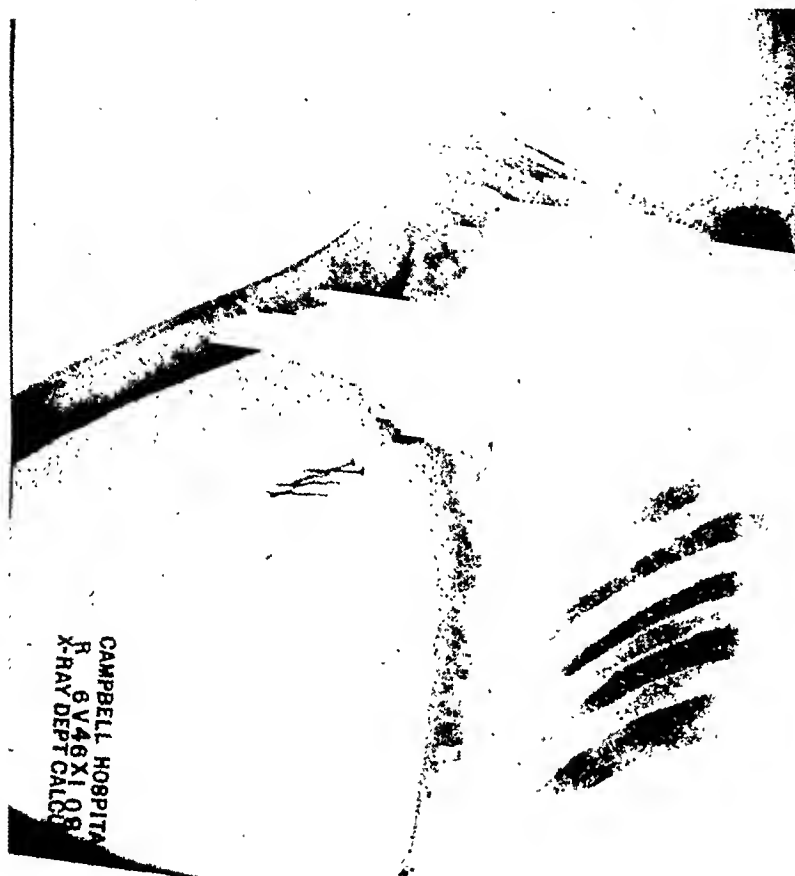


Fig. 2.—Shows the living graft and old dislocated head of the humerus.



Fig. 3(a).—Position of right upper extremity after arthrodesis. (Neutral position.)



Fig. 3(b).—Showing the amount of abduction.



Fig. 3(c).—Abduction. External rotation for combing.



Fig. 3(d).—Abduction. Flexion during taking food. (Lateral view.)



Fig. 3(e).—Same as (d). (Antero-posterior view.)

PLATE XVII

OBSERVATIONS ON ANÆMIA IN THE MALNAD PARTS OF THE MYSORE STATE : N. A. AIENGAR, B. R. LAXMI.
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Radiograms of stomachs of four cases.



- Note.*—1. The peculiar tubular-shaped stomach.
2. The irregular formation of duodenal cap.
3. The hyperexcitability of the stomach wall.

Photographs of nutritional ulcers of two cases.



Photographs of persons with enlarged spleen.



per day. The extremely bad cases have got to be fed very carefully since they develop diarrhoea if their full quota of diet is given. During seasons oranges are given free to all deserving poor patients.

As for medicines, they are put on injections of liver extract and a mixture consisting of ferri-et-ammon citras, quinine sulph, acid hydrochlor dil, liquor arsenicalis and aqua. Nicotinic acid or yeast tablets are administered daily as a routine. The deworming operations are started with care. They are undertaken only when the patients get to a fairly tolerable condition when they can put up with a purgative. The skin is attended to for any dermatitis and the ulcers, if any, are cleaned up. As their general condition improves, automatically the ulcers heal without any further treatment. Whenever possible the foot of the bed is raised. It is observed during the course of treatment that many of these cases show some improvement till they reach a level of 2.5 to 3 million R.B.Cs., and there seems to be a sort of a dead stop at that. Nothing seems to improve them or, if at all, the progress is very very slow. The enlargements of spleen reduce only to the level of fibrosis; beyond that nothing helps them; but when there is a response, the reduction in their size is something marvellous. Spleens that occupied the whole of the abdominal cavity and were felt low down in the pelvis, have been reduced to the extent of just being palpable. It is the extreme cases that are very difficult to handle. Unfortunately for these patients many of them cannot stay in a hospital long enough. Wherever there has been some improvement, patients have stayed for over 6 to 8 months and yet at that time one cannot pass them as fit and normal individuals to be sent out. Since most of them are farmers and farm-labourers, they get back too soon to attend to the farmyard work or it may be that somebody brings them information from the village that a calf has been killed by a wild animal; nothing can keep them back when such news arrives. They rush back to the villages only to get worse very soon and either collapse there or come back to the hospital in a much worse condition. The artificial surroundings of a hospital and the diet supplied there, they cannot get in their homes. Unless they are educated in a proper form so that they understand what health means to themselves, to their family, and to their country at large, this constant and rapid depopulation in this part of the country will go on. Recently one of us had a conversation with a large estate owner in the interior of this part of the country. The gentleman informed him that if the government did not take some radical step soon enough to prevent this depopulation, the gardens and fields would be no more there in a few years and the country would be one wide area of jungle. In his opinion there was no labour available at all. Even at the increased rate of payment of wages people refused to go to these parts and settle,

because of ill health. Fresh and vigorous blood must be brought into the country to settle down living under all sanitary principles. This alone seems to be the remedy. Otherwise it is a fight against all odds to try to cure these people. Nay, it is a waste.

We have tried in these cases the various products of liver extracts of different makes like Anahæmin, Neo-hepatex, Hepatex T., Reti-culin, T.C.F. Liver Extract, etc. It is observed that Anahæmin and Neo-hepatex give a good initial stimulus in cases in whom the colour index is above 1. This is later kept on well by other crude liver extracts. In some cases intra-muscular blood has also given the starting stimulus. Later, crude liver extracts maintain the regeneration better than the highly potent liver extracts. We might mention that cases where Campolon has been exhibited, quicker changes are noted. No two cases respond similarly to the same brand of liver extract. Very rarely have we found any anaphylactic reaction of a serious nature setting in. In only one extreme case where a potent liver extract had to be exhibited, and where it was reported that the person did not tolerate any sort of a parenteral treatment with liver extract, the patient had to be desensitized first.

Conclusion

1. A study of 2,000 cases of anæmia admitted to the McGann Hospital, Shimoga, and spread over a period of 4 years has been made.
2. Most of these cases are tropical, nutritional, macrocytic, hyperchromic anæmias.
3. The main causes are malnutrition or deficient nutrition, malaria and helminthiasis.
4. Contributory causes are a degenerate or dead civilization, lack of education and poor economy.
5. No curative procedure is of any avail since it involves a large portion of the population.
6. Widespread sanitary measures involving a lot of finance, universal useful education, and raising the standards of living are the only remedy. This appears to be impracticable at present under the existing conditions.

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CORRIGENDA

THE EFFECT OF PROCESSING AND SOURING MILK BY THE INDIGENOUS METHOD

By K. S. RANGAPPA

In the June 1947 *I.M.G.*:

Page 320, column 2, line 4, for 'scalding' read 'holding'.

Page 322, under *Discussion*, column 1, line 19, for 'The allowance' read 'When allowance'.

The Indian Medical Gazette Fifty Years Ago

THE PASTEUR-CHAMBERLAND SYSTEM OF FILTRATION AT THE DARJEELING WATERWORKS

(Reprinted from the *Indian Medical Gazette*,
August 1897, p. 301)

GREAT interest attaches to the introduction of the Pasteur-Chamberland system of filtration in the Darjeeling Waterworks owing to its being the first occasion on which a town has been supplied with drinking water subjected to a system of filtration which aims at the exclusion of all micro-organisms that may be in the water at the time of its collection at the reservoir. The Pasteur system has been used with the greatest success for many years past, notably in the hospitals, barracks and public institutions of France, but never on any very large scale. Naturally, sanitarians are awaiting with interest the result of the installation at Darjeeling; for, if it meets with the success there that is anticipated, there can be little doubt of the introduction of the system into other towns and localities.

For many years past the Darjeeling drinking water has had a bad name. Complaints have been repeatedly made both by the Public and the Press as to the condition of the water-supply, and medical opinion has always been unanimous that much of ill health at Darjeeling has been due to this cause. Analysis, both bacteriological and chemical, supports this view. In 1894, Surgeon-Lieutenant-Colonel Cobb, then Civil Surgeon of Darjeeling, when visiting the Indian Medical Congress, had an opportunity of becoming acquainted with the working of the Pasteur system, which was then on exhibition there. Having previously been much impressed with the necessity for an efficient method of filtration for the Darjeeling water, it occurred to him that the system was well adapted for this purpose. He accordingly wrote for the Darjeeling Municipality a note on the subject, entering fully into the reason for the adoption of the filter. This note was published in the *Indian Medical Gazette*. Much opposition was at first brought to bear against the project, but with the invaluable assistance of Mr. Greer, Deputy Commissioner of the district, who fully realized the importance of Dr. Cobb's proposal, and who did everything in his power as Chairman to advance the scheme, the Darjeeling Municipality towards the end of 1895 decided to adopt the Pasteur-Chamberland filter for their water-supply, and Messrs. Heatly and Gresham were entrusted with the work. These gentlemen have now completed their work, and we are informed that the filters are ready for use.

The filter consists of 38 cells of tough cast-iron lined with acid-resisting composition and arranged in four rows. Each cell is connected by wrought-iron pipes to cast-iron mains, which deliver into cast-iron collecting mains, all of which are protected with a similar composition. The cells are fitted with gunmetal valves, allowing any one cell or group of cells to be isolated for cleaning or other purposes; a travelling crane allows of any cover to be readily taken off if required. Each cell contains a number of Pasteur filter tubes in the well-known form, fixed into a solid elastic block which forms an impermeable joint. The inlet and outlet pipes are controlled by valves in the ordinary way, and, by means of small air compressor, the mechanical and bacterial soundness of each cell, or any group of cells, with their constituent filter tubes, can be immediately tested. This is owing to the circumstance, apparently peculiar to the remarkable medium of which the Pasteur tubes are composed, that, when soaked with water, the minutest invisible flaw will permit the passage of air under a pressure of 10 lb. to 15 lb. per square inch, while, if sound, it will retain it. The cleaning is effected by means of a circulating pump, fed from a small boiler fitted with Gresham's combination injector. This forces through the tubes of any cell or group of cells a solvent—usually a diluted acid—by which the dialytic deposits in the pores of the filter tubes is removed, while the whole of the filtering system is sterilized, and as the acid can be used again and again, it is accordingly both economical and free from objection. Arrangements are also made for sterilizing by steam. The whole of the parts of the installation is interchangeable. The installation will be worked by one man, who could, indeed, attend to a much larger system. The tubes wear for practically an indefinite period and the cost of upkeep is accordingly relatively small. It apparently only remains now for the system to be put into operation, and its effects on the water-supply and the health of the Darjeeling population to be carefully observed and recorded.

LONDON LETTER

(Reprinted from the *Indian Medical Gazette*,
August 1897, p. 303)

THE Jubilee proceedings are ended and happily without disaster. Never, in the whole history of Great Britain, were the national feelings so acutely affected as on this occasion, and from one end of the kingdom to another, these found vent in fêtes and rejoicings, processions, displays, feasts, bonfires and illuminations. London underwent a complete transformation. Its principal streets through which the Royal procession passed were placed beyond recognition by stands and boardings, bunting and baize, festoons and flowers and gay decorations of every sort. But there was hardly a domicile in

the whole of London, however poor or small, which did not hang out a flag or show a coloured light. The trains carried millions of people to and fro, and the thoroughfares were crammed with conveyances and pedestrians. Yet so admirable were the precautions adopted by the police and the Railway Companies that no accident of any importance occurred in any part of the kingdom. The day of the procession was a hot one, and the crowded streets stifling. Many cases of mild heat stroke occurred among both soldiers and spectators, but stretchers and ambulance wagons were at hand and every appliance ready for restoring the faint and reviving the weak.

The great Naval review at Spithead and Military review at Aldershot also passed off without a hitch, and the august personage in whose honour the celebration was held went through all the trying proceedings connected with it without faltering or fatigue. The newspapers have been full of resumes and reminiscences *usque ad nauseam*.

The Medical Press had not been wanting in this respect, and surgical progress during the last sixty years have been presented by the *Lancet*, *British Medical Journal*, the *Practitioner* and other journals. It is a marvellous tale and well worth the telling; anæsthetics, antiseptics, and the Roentgen photography are probably the most dramatic elements in the narrative; but the birth and development of sanitation and preventive medicine constitute the most remarkable, valuable and fruitful outcome of the period.

The era has been noteworthy on account of two great controversies which have profoundly affected medical science and practice. The first was the change of type controversy. The abandonment of blood letting and other spoliative and depletory measures in treating diseases was held by one school to be due to the advance of knowledge and the advent of more enlightened conception of what caused and constituted disease and of what was necessary to avert or cure. According to another school, represented by the older and more conservative men, the change in practice was considered to be owing to a degeneration in the constitution of human beings in consequence of which pathological processes presented a more asthenic complexion demanding support by food and wine rather than suppression by lancet, emetic and purge. The debate waxed warm, at times almost violent, but the result was that diseases were no longer treated, as malignant entities to be expelled by evacuants but as phases of disordered life to be rectified by time, rest, nursing and a careful and thoughtful encouragement and support of the *vis medicatrix naturæ*. Disease processes are now known to be in many, perhaps in most instances, to be conservative or recuperative in their action, and the rational treatment of disease in the present day tends to travel backward along the path of causation and endeavour to keep the spring of life free of contamination at its origin and to prevent pollution

of the stream as it proceeds by anxious attention to the environment. The other controversy in which the names of Pasteur and Pouchet were prominent concerned the question of spontaneous generation which has been finally and absolutely set at rest by the ingenious experiments which have demonstrated anew the truth of the old doctrine—*omni vivum ab ovo*; and have opened the portal of the great and promising study of bacteriology. The creation *de novo* of living forms may have occurred in geologically remote epochs, but no such process takes place in the present day, and even minor adaptive changes in the form and structure of living beings, caused by the force of evolution, are slight in character and slow in manifestation. So that fortunately for us and our art we can still place reliance on the great laws and uniformities of nature and eliminate from our thoughts and expectations all chance of probability of starting apparition of novel beings even of microscopic dimensions.

I am glad to observe that both in India and in this country the necessity of a law of medical registration is being again urged. The public ought to be protected against incompetent practitioners, and the State ought to insist on competence founded on proper training and testing and to declare by means of an official register the names of persons who have obtained medical degrees and diplomas on conditions which ensure sufficient knowledge and skill in their possessors. Certainly no private body or association should be permitted to grant licences to practise without State sanction conferred after taking guarantees and *bona fides* and soundness. My own firm opinion is that for the present the Indian Universities should be utilized as the instruments of testing and conferring medical qualifications; and that no medical college or school should be permitted to exist which is not affiliated to a university under conditions which should insist on proper arrangements and appliances being provided for teaching and training. It is contended that a diploma is wanted in India on easier terms as regards preliminary knowledge and special education and the final examination than the universities consider obligatory. I am convinced that the licences of the universities are granted on as easy terms as it is safe to concede, and that to lower medical education and the granting of diplomas to practise beneath the standard would be to degrade the profession and set loose incompetent practitioners.

It is argued that these find their way into practice in the shape of failed students notwithstanding, and that a cheaper diploma would bring many of these men into the fold of legitimacy. But, however low the standard is reduced, there will still remain the incompetent irregular practitioner who cannot be prohibited from practising as long as he manages to escape the clutches of the criminal law. It is vain to

attempt to bring these men within any scheme of medical registration which should include only those who have obtained qualifications declared by the law to be sufficient to entitle their holders to practise the medical profession, fill public medical and sanitary appointments, grant certi-

ificates of health, sickness and death, sue for fees in courts of law, give evidence as specialists, and generally perform such acts of a public or a quasi-public character as may fall in their way; all unregistered practitioners or persons being held legally disqualified to fulfil such functions.

Current Topics, Etc.

Exfoliative Dermatitis from Gold

(Abstracted from the *Journal of the American Medical Association*, Vol. 133, 8th March, 1947, p. 733)

BRITISH antilewisite (BAL) (Hynson, Westcott and Dunning) has been used in several cases of dermatitis due to gold with gratifying results. However, the number of cases is as yet too few to be conclusive and the response to BAL was most satisfactory when the rash had been present for less than two months. In one case in which the rash had been present for over three months, improvement following the use of BAL did not occur, since presumably after about three months the process tends to become irreversible. At present, with its apparent innocuousness BAL should be tried. BAL is prepared as a 10 per cent solution and for a person weighing 150 pounds (68 kg.) the dose has been 150 mg. (1.5 c.c.) five times a day for one day, four times a day for two days and three times a day for three days. This should be given deep intramuscularly. Toxic symptoms consist of nausea and vomiting, fibrillary twitchings and salivation. If these appear, the next dose should be omitted. When BAL is effective, the pruritus usually stops within twenty-four hours of the institution of treatment. If the pruritus is not affected by BAL, radiotherapy can be tried and is helpful at times. For local application, petrolatum ointment with 1 per cent phenol can be used and is apparently not harmful. It is unlikely that the pigmentation will completely disappear within five or ten years.

The Public Health Service as a Career

By SMr ALLEN DALEY

(Abstracted from *The Medical Officer*, Vol. LXXVI, 28th September, 1946, p. 137)

THE imminent social changes in England have been preceded by a quieter, but no less fundamental change in the public health curriculum and examinations. Official preventive medicine to-day includes many posts in such fields as tuberculosis, maternal and child health, epidemiology and venereal disease which are essentially clinical. The holders of these posts in many instances have no desire to hold appointments as medical officers of health and have hitherto spent time in acquiring the D.P.H. which would be better spent in acquiring experience of their own special branch of work. Some knowledge of public health is, however, essential in these branches, and to meet the need the General Medical Council has approved a course of whole-time study of not less than an academic term of ten weeks or equivalent part-time instruction. This covers such subjects as the history of public health and public assistance, the existing functions of central and local authorities and voluntary organizations, social security, international health organizations, vital statistics, epidemiology, environmental hygiene, the principles of health education, etc. This course is followed by a new examination and the issue to those who negotiate it of a Certificate in Public Health (C.P.H.). Universities and licensing bodies throughout the country have now held their first C.P.H. examination and in theory some hundreds of men and women are free to apply

for posts as assistant medical officer of health. Strikingly few are doing so; the vast majority are proceeding to the two further academic terms of work which leads to the D.P.H. This may be a temporary phenomenon. Service experience has probably given a good many men a chance to display latent administrative talent which would have had no opportunity to manifest itself in peace-time domestic medicine. These, naturally, will wish to secure the full qualification for an administrative public health post, and it is equally natural that many others, contemplating a career in some clinical branch of the public health field and with no administrative ambitions, should take one rather than two bites at the cherry and proceed to the full specialist qualification. It will be of great interest in the next few years to observe the relative numbers of those who limit themselves to the C.P.H. and of those who take the D.P.H. If a large majority follow the second course, one of the main objects in introducing the C.P.H. will have been nullified. Even if that happened, however, it by no means follows that the innovation will be a failure. The deductions from present limited experience appear to be that the three months' general course and examination give the student a background which will enhance the value of the subsequent six months' training.

This period of training also has changed considerably from that given for the pre-war D.P.H. Systematic instruction in physiology, and nutrition, bacteriology, parasitology, community diseases, sanitation, statistical methods, medical administration, public health law, the mental health services and occupational health, is supplemented by infectious disease hospital practice, and regular attendance at an approved public health department. An essential part of the D.P.H. examination is the presentation by each candidate of a day-book, in which he has made regular entries with observations and conclusions on the subjects of practical instruction in the course, and a dissertation on an approved subject.

This revised course, which gives due weight to the views and experience of the Society of Medical Officers of Health, among other bodies, shows the continuing keen interest of the General Medical Council in public health education. Most people of experience would agree that both the C.P.H. and the D.P.H. courses are functionally very well adapted to the purpose they are designed to serve, and no man, whatever his branch of medicine, would fail to derive benefit from one, or both when two years of post-graduate experience have qualified him to enter the course.

A Danger from Infested Drugs

(Abstracted from *The Pharmaceutical Journal*, Vol. 158, 25th January, 1947, p. 60)

FROM time to time we have drawn attention to insect infestation of crude drugs, and indeed the danger of deterioration from this cause is a constant cause of concern to those who hold stocks of these products. From the point of view of the pharmacognocist, the problem has not been concerned with measures to prevent infestation and to recognize the signs of deterioration when it has occurred. There is, however, another aspect of the danger which must be considered

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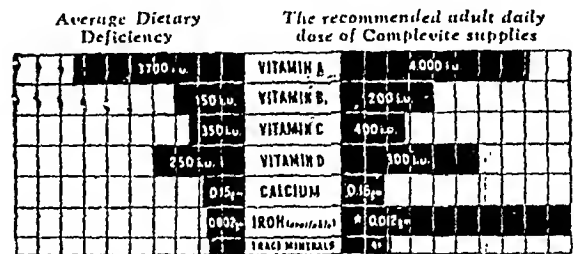
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June 7th, '45. Creases and scars excised. Left airway established.

September 13th, '45. Width of base of nose reduced. Fleshy tips straightened.

June 27th, '46. Examination showed the flaps to have settled in very well

all over, and the airway completely established.

The details and illustrations above are of an actual case. T. J. Smith & Nephew Ltd., of Hull, England, manufacturers of Elastoplast and Jelonet, publish this instance—typical of many, in which their products have been used with success.



Fig. 1

skin graft, prevent the raw surfaces adhering, and provide a good airway. A forehead flap conveyed by a curved left temporal artery flap was raised, and dermatome grafts were placed over the stent moulds to join the nasal linings, before the flaps were sutured into position. A dressing of Jelonet was applied with Elastoplast fixation.

August 26th, '44. Forehead flap severed.

November 30th, '44. Bone graft to nose.



Fig. 2



Fig. 3

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in the light of a report in the *British Medical Journal* (11th January, 1947, p. 54), on 'An Unusual Case of Intestinal Myiasis', from which it appears that the use of insect-infested drugs may present a danger to the patient. The report describes a single case of a woman who, for two weeks, suffered from frequent attacks of diarrhoea and constipation accompanied by some general abdominal pain of a colicky nature and the passage of blood per rectum. Larvæ were isolated from the stools and identified as *Plinus tectus* Boield. It is suggested that the eggs of the insect protected by their outer chitinous membrane, passed through the stomach and subsequently developed into larvæ in the more alkaline portion of the bowel. The larvæ might resist the effects of peristalsis for some time by clinging to the villi by means of the sharp claws on the legs and the biting jaws. Treatment of the patient with one fluid ounce of liquid paraffin nightly for a week gave a satisfactory result.

The coleopterous insect *Plinus tectus* is widely distributed throughout the world, and was first reported in Great Britain in 1901, but has since become widespread. It has been found in many dried food products, such as figs, beans, maize, cocoa beans, and in some drugs and spices, including almonds, nutmeg and ginger. The allied species *Plinus fur* has been more frequently reported in crude drugs, and a comparative description of the two insects, with drawings of *P. tectus*, are given in an article in *The Pharmaceutical Journal* for 5th June, 1937, p. 577. The eggs are less than 1 mm. in length, ovoid and white; the larvæ are about 4 mm. long, very hairy, dirty white in colour and, in the resting position, distinctly curved. There appears to be no evidence that in the recent case of intestinal myiasis the larvæ were derived from an infested drug, and, in view of the more common infestation of packed cereal products after domestic storage, the latter may be considered as a likely source. The danger from infested drugs should not be exaggerated, but it is clear that care must be exercised, particularly with powdered drugs, and rubbed herbs used for making domestic infusions, for, although the eggs of insects are destroyed on boiling, maceration in tepid water may permit survival. It is usually impracticable to store large quantities of crude drugs in sealed containers, but when relatively small stocks are held, they should be stored in well-closed containers and examined at intervals. Grossly infested material should be destroyed by burning, but when not more than a trace of infestation has occurred, it may be eliminated by adding a small quantity of chloroform, carbon tetrachloride, or carbon disulphide to the material in the container, taking care that closure is perfect.

The Complement Fixation Reaction in Asiatic Schistosomiasis Employing Cercarial Antigen

By F. ELEANOR WILLIAMS

(Abstracted from the *Transactions of the Royal Society of Tropical Medicine and Hygiene*, Vol. 40, March 1947, p. 421)

AN extensive serological survey by means of the complement fixation reaction was made in 560 members of the R.A.A.F. exposed to infection with Asiatic schistosomiasis over a period of 16 days at Leyte in the Philippines. The antigen used was an 18-year-old alcoholic extract of the livers of snails (*Planorbis exustus*) infected with cercariæ of *S. spindale*. It had been prepared in India by Fairley's technique and was despatched to Australia in 1927.

The sera from 169 individuals (135 of whom had already received treatment) yielded positive complement fixation reactions of different intensity; the amount of complement fixed varied from 3 to 40 M.H.Ds. Ova were demonstrated in 144 of these cases and were not found in twenty-five instances.

In 391 individuals whose sera yielded a negative complement fixation reaction, repeated examinations of the stools revealed ova in only five instances.

Of 365 individuals who were previously regarded as not infected and who received no treatment, thirty-four (9.3 per cent) yielded a positive complement fixation reaction and twenty-seven (7.4 per cent) showed ova in the stools. Twenty-six of the twenty-seven with demonstrable ova in the stools showed a positive serological reaction.

A comparison of the complement-fixing power of the sera and the ova content of the stool indicated that the persistence of a strongly positive complement fixation reaction (7 M.H.D. or over) 6 months after treatment is evidence of persisting infection, i.e. living schistosomes.

No evidence of false positive reactions was recorded in non-bilharzia sera, and positive reactions were never noted in Wassermann-positive sera collected from individuals not exposed to schistosome infection.

The serological reaction proved of outstanding value as a less tedious and a somewhat more laboratory test than repeated faecal examinations for ova. No investigation in an outbreak of this kind would be complete unless the complement fixation reaction on sera as well as stool examinations were carried out in individuals exposed to infection. Both laboratory procedures are essential if the true incidence of schistosomiasis is to be determined.

The presence of persisting positive serological reactions in the absence of demonstrable ova is explicable on the basis of (a) unisexual infection at the time of exposure, (b) the exclusive or predominant survival of male worms following treatment, and (c) the mildness of the original infection, there being so few worms that ova were not present in sufficient number to be demonstrable.

Benign Lymphocytic Meningitis

By B. W. MURPHY

(Abstracted from *The New Zealand Medical Journal*, Vol. XLVI, February 1947, p. 37)

Two cases of benign lymphocytic meningitis are presented. A substantial reduction in the level of cerebro-spinal fluid chlorides was found in both. The reduction in chloride level usually regarded as being suggestive of tuberculous meningitis was misleading.

The diagnosis of benign lymphocytic meningitis appears justifiable on both clinical and laboratory grounds. The disease is commonly associated with respiratory infections. The first patient had an 'influenza-like' illness before admission; the second showed evidence of upper respiratory infection. In neither was there anything to suggest that the patient had recently suffered from any of the acute specific fevers occasionally followed by a meningo-encephalitis. There was no evidence of involvement of brain, cord or nerve roots.

Both patients developed the clinical picture of a moderately severe meningitis of fairly acute onset and both made a rapid and complete recovery.

Benign lymphocytic choriomeningitis frequently follows a respiratory infection. Headache, malaise, vomiting and fever develop, usually acutely. Signs of meningeal irritation are present. Papilloedema may or may not be present. The cerebro-spinal fluid shows the following changes. The pressure may or may not be increased. Globulin is moderately increased. A predominantly lymphocytic pleocytosis is present, counts ranging from 30-1,500 cells. In the initial stages polymorphs may predominate.

In the examples here reported the chloride figures were well below the normal standard of 725-750 per 100 c.c.

A filtrable virus which produced a constant type of lymphocytic infiltration of the meninges and choroid plexus in experimental animals has been recovered from the spinal fluid of patients with this disease. The

specific virus is probably responsible for most of the cases, but other pathogenic agents may produce the syndrome.

In the second case the history together with the low chloride level in the spinal fluid suggested tuberculous meningitis in the first few days of illness. It would appear that a reduced chloride figure cannot be relied on entirely to distinguish between these two conditions.

Limitations of Folic Acid

(Abstracted from the *Lancet*, i, 1st February, 1947, p. 182).

THE value of folic acid in the treatment of pernicious anæmia can be regarded as established, but at the present price (1s. 2d. for 10 mg.), it is so much more expensive than parenteral liver treatment that it is likely to be reserved for difficult cases. In non-tropical sprue results have been irregular: some patients have responded well, others only partially or slowly; some have improved so far with folic acid and then further progress has been obtained with proteolysed or ordinary oral liver treatment, while others have shown the reverse. The preliminary results in coeliac disease, which are all we yet have to go on, suggest that the response is slow and that perseverance in treatment is necessary before failure is conceded. That some patients with non-tropical sprue or coeliac disease and a normoblastic marrow would not respond was to be expected because it is reasonably clear that folic acid is effective only where megaloblastic erythropoiesis is present.

In this issue Spies and Stone report an observation which, if confirmed, will establish a serious limitation in the value of folic acid in pernicious anæmia; for they find that folic acid has no effect on the degeneration of the posterolateral tracts of the spinal cord commonly associated with the disease. Not only has folic acid failed to relieve this syndrome but the neurological signs have worsened while the patient was receiving it; and similar results are reported with thymine. All the patients recovered when given an ordinary concentrated parenteral liver extract. It will be recalled that Doan noted a remission of minor neurological signs—presumably due to peripheral neuritis—in his cases of pernicious anæmia given folic acid, and none of his patients had developed neurological changes while on treatment; so far this has also been the experience in this country, but there has probably not been sufficient time for any such complications to appear.

The findings of Spies and Stone have practical and theoretical implications. The practical ones are that cases of pernicious anæmia on regular folic acid must be carefully watched for the onset of posterolateral cord signs and promptly put on liver extract if these appear; and when such signs are already present the patients are best treated with liver. On the theoretical side this report would have delighted Arthur Hurst, who contended that the hæmopoietic factor was distinct from the neurotrophic factor. It fits in too with other evidence suggesting that folic acid cannot in every case of pernicious anæmia completely meet the deficiency that is filled by a liver extract that some cases are also suffering from the lack of an unidentified factor.

Habitual Hyperthermia: Premenstrual 'Fever'

By H. A. REIMANN

(Abstracted from the *Journal of the American Medical Association*, Vol. 132, 21st September, 1946, p. 144).

IN 1932 under the title of Habitual Hyperthermia the writer reported the case of a woman aged 23 whose temperature had often been above the average normal for eighteen years. The 'fever' led a succession of physicians to seek for infection or other causes of it and led to a long period of unnecessary, enforced semi-invalidism. On prolonged study the temperature

was shown to have a regular relation to the menstrual period. It was normal or subnormal during the first half of the menstrual cycle, rose to levels higher than normal at the mid-period when the follicle matures and persisted at high levels until the day before the menses, when it dropped again.

In the majority of women the rhythmic fluctuation of the temperature seldom exceeds the average normal level of 37°C. (98.6°F.) and is usually unnoticed unless careful registrations are made. In certain otherwise normal women whose temperature rises above normal, prolonged and unnecessary search for the cause of 'fever' is often made unless the temporal relation of the fluctuation to the menstrual cycle is recognized. The problem of diagnosis is greater when a neurosis also is present.

At the time the report of the case was published it was planned to observe the effect of the course of time and especially of pregnancy on the cyclic temperature curve, but the patient married and lived in China until recently. During that time there were six pregnancies, resulting in 4 living normal children, an attack of typhus, several bouts of malaria and the usual hardships in a war-torn country. Unfortunately, the exigencies of living prevented measurement of the temperature during the periods of pregnancy. No further study was made until the patient returned to this country in September 1945, fourteen years after the previous report was made. Registration of the temperature twice daily over two menstrual cycles revealed the usual course of events with low temperature of 36.1°C. (97°F.) from the first day of the menstrual period to the mid-period, an abrupt rise to 37.4°C. (99.3°F.) then a fall to subnormal the day before the next period. No other signs or symptoms occur.

While the periodicity of the 'fever' in the childhood of the patient is not known, temperature at fever levels was first noted at the age of 5 and has continued, later in rhythm with the menstrual period, for thirty-two years. It will be of interest to see what effect the menopause will have on the temperature.

Treatment of Typhoid Fever with Type Specific Bacteriophage

By E. G. KNOUF *et al.*

(Abstracted from the *Journal of the American Medical Association*, Vol. 132, 21st September, 1946, p. 134)

Type specific bacteriophage was used intravenously in the treatment of 56 patients with typhoid fever. Three patients had complications before treatment began, but recovery occurred. The mortality for the series was 5 per cent.

Treatment by means of type specific bacteriophage offers a promising and safe procedure against typhoid fever. Patients must have careful general care according to their particular needs. Type specific bacteriophage is the accepted form of therapy against the disease in the Communicable Disease Unit of the Los Angeles County General Hospital for all patients whose *Eberthella typhosa* organisms can be typed.

Congenital Pyloric Stenosis

(Abstracted from the *British Medical Journal*, ii, 14th September, 1946, p. 407)

CONGENITAL pyloric stenosis is undoubtedly inherited, but it is uncertain whether the disorder is recessive or dominant. Studies of large numbers indicate a higher degree of cousin marriages among the parents than would be expected on a chance sample of the population, which favours a recessive gene. On the other hand recorded instances of a child and his parent both having the disorder are not uncommon, and pedigrees have been published which give the appearance of a dominant gene. The condition has been found at birth

and even in a foetus, so that the cause must be prenatal and not due to feeding or any postnatal factor. Some disorder of the autonomic system is usually postulated, but it is also said that the so-called hypertrophied muscle is abnormally packed with glycogen, as is found in Von Gierke's disease.

Sensitivity to Penicillin

By W. J. O'DONOVAN

and

I. KLORFAJN

(Abstracted from the *Lancet*, ii, 28th September, 1946, p. 444)

THE case is recorded of a patient who became sensitive to penicillin in the course of ordinary dermatological treatment with penicillin spray.

Anaphylactic shock followed an intramuscular injection of penicillin.

Oral administration of penicillin brought about complete desensitization, abolishing superficial skin hypersensitivity and the shock effects of parenteral penicillin.

Actinic sensitivity developed and faded *pari passu* with penicillin sensitivity.

Medicolegal

A NAME MISHEARD

(Abstracted from the *Lancet*, i, 26th April, 1947, p. 571)

CONFUSION between the words 'procaine' and 'cocaine' led to a fatal accident and raised questions of liability for negligence. Mr. Justice Hilbery dealt with the facts in deciding the case of *Collins v. Hertfordshire County Council and King* last month. The circumstances he said were so extraordinary that he could not believe they were ever likely to occur again. Hospital managements it may be added will be alert to see that they do not.

A patient entered the Wellhouse Hospital at Barnet for an operation on his jaw. Arranging to give an injection before operation the surgeon telephoned an instruction to have ready 100 ml. of 1 0/o. procaine and 1/200,000 adrenaline. The message was taken by a student (not then qualified) acting as student house surgeon; she misheard the instruction and asked the hospital pharmacist to prepare a solution containing 1 0/o. cocaine. The operating surgeon injected 80 ml. of this solution—some four times the lethal dose—and the patient died. The widow claimed damages both from the county council (as the owners of the hospital) and from the surgeon who gave the injection.

The defendant surgeon stated in evidence that he himself always called the drug 'procaine'. The term 'Novocain' adopted by German manufacturers as its trade name had been commonly employed; but at the beginning of the late war the medical profession had been asked not to use it. He had never known of cocaine being given by injection and he had no idea that he had injected it. He could not understand an experienced pharmacist dispensing so large a quantity of a dangerous drug; the amount of adrenaline was unusual and the pharmacist should have queried it. The regulations, said the surgeon, require that dangerous drugs be dispensed only on the written instructions of a qualified medical practitioner; the pharmacist had dispensed this solution to an unqualified person without referring the matter back to himself or insisting on the signature of a qualified practitioner.

The judge found that the surgeon who gave the instructions by telephone and who made the injection was negligent. The surgeon had expected the student house surgeon who took the message to use her knowledge and reason and to apply her mind to what he was saying; but still the surgeon himself was responsible for not making sure that he was getting what he had ordered. The student house surgeon,

continued the judge, was negligent; she knew that the solution was required for an injection and she knew that the solution as prepared was lethal; she had not used reasonable skill or care. Further, the pharmacist was negligent. He had accepted an oral demand for an exceptional dosage of cocaine and adrenaline for injection and had not required the order to be initialed by a qualified person; he had not checked the demand with the surgeon; and he had disregarded all the prescribed safeguards including the cautionary instruction in the British Pharmacopoeia that when an usually large dose of a drug appears to have been prescribed the pharmacist or dispenser should satisfy himself that the prescriber's intention has been correctly interpreted. Finally, the judge found the hospital responsible. It was liable for the negligence of its two employees (the student house surgeon and the pharmacist) and it had failed to establish a proper system and to insist upon obedience to the rules about dangerous drugs. 'If the hospital had had a proper system this solution could not have arrived at the operating theatre let alone the body of the unfortunate patient.' The judge awarded £2,500 damages and directed that payment be borne equally by the county council (as owners of the hospital) and the surgeon.

It will be remembered that the risk of confusion between procaine and the proprietary preparation 'Percaine' was dealt with by the manufacturers of the latter changing its name to 'Nupercaine' (*Lancet*, 1942, ii, 221, 340). As Mr. Justice Hilbery deemed the circumstances in the *Collins* case unlikely to recur there seems no need to rechristen all our dangerous drugs with names chosen like those of the London telephone exchanges for their distinctive enunciation so as to avoid all possible risk of misunderstanding. With ordinary and proper care these accidents will not happen even when hospital staffs are overworked and undermanned.

COVENANTS IN RESTRAINT OF COMPETITIVE PRACTICE

(Abstracted from the *Lancet*, i, 3rd May, 1947, p. 610)

PARTNERSHIP or other agreements containing covenants restrictive of competitive practice may need different drafting in the light of a recent decision of the Court of Appeal.

Dr. D. J. L. Routh and Dr. T. D. G. Wilson practising at an address in Okehampton engaged Dr. C. G. Jones to assist them under an agreement which contained the following covenant. Dr. Jones undertook that within a radius of 10 miles from that address and within a period of five years from the end of the engagement he would not practise or assist any other person to practise any form of medicine, surgery or midwifery nor would he accept any professional appointment within those limits. The plaintiffs claimed that the agreement came to an end in February 1946, that the restrictive clause then came into effect and that an injunction should be granted to restrain Dr. Jones from practising within the 10-mile radius in contravention of the covenant.

These covenants 'in restraint of trade' are legally enforceable only if they are reasonable and not too vague. The classic statement of the law was uttered by Lord Macnaghten in *Nordenfelt v. Maxim Nordenfelt Co.* in 1894.

'The public have an interest in everyone's carrying on his trade freely; so has the individual. All interference with individual liberty of action in trading and all restraints of trade of themselves if there is nothing more are contrary to public policy and therefore void. That is the general rule but there are exceptions. . . . It is a sufficient justification if the restriction is reasonable—reasonable that is in reference to the interests of the parties concerned and reasonable in reference to the interests of the public so framed and so guarded as to afford adequate protection to the party in whose favour it is imposed while at the same time it is in no way injurious to the public.'

When the Okehampton case came before the Chancery Division last December, Dr. Jones pleaded that the agreement was too wide and that in the circumstances it was unreasonable. He tendered evidence of the shortage of medical practitioners in the Okehampton area and he said he was willing to give an undertaking for a period of eighteen months from March 1946 not to accept as patients any patients whose names were on the plaintiffs' books at the termination of the engagement. Mr. Justice (now Lord Justice) Evershed dismissed the claim with costs. The onus was on the plaintiffs he said to establish that the covenant was reasonably required for their protection. He considered one part of the covenant to be too wide and therefore unenforceable. The plaintiffs appealed but without success. The Court of Appeal has held that the restrictive covenant went much further than was reasonably necessary to protect the appellants' practice as general medical practitioners. The covenant would prevent Dr. Jones from setting up as a consultant or from taking an appointment as medical officer of health. In neither capacity would he be damaging the appellants' practice. The result was that the whole covenant was bad and the appeal must be dismissed with costs. Leave to take the case further to the House of Lords was refused.

Some of the older cases on restriction of competitive practice (like *Davis v. Mason* for instance where a fourteen-year restriction within a 10-mile radius was held good) are probably of little importance in modern conditions. Generally the law draws a distinction between a trade like a mail-order business where most of the work is done by post or possibly by telephone and an occupation like medical practice which requires personal attendance. In the former case wide areas of restriction are allowed by law; in the latter they are deemed less reasonable. The most helpful decision in recent years was that of *Eastes v. Russ* in 1914.

Dr. Eastes had initiated in Queen Anne Street in 1901 the business of a pathological laboratory; he examined and reported upon chemical, bacteriological and other specimens. His clients at first were mostly Harley Street consultants; but as his business grew his services were required by general practitioners who learnt to appreciate the value of this scientific development and by medical officers of health. In 1905, when he was employing several assistants, he engaged Dr. Russ as an assistant on terms that he would not engage in similar work within 10 miles of the laboratory. The agreement having been ended in 1912. Dr. Russ soon afterwards set up in Beaumont Street within half a mile of the Queen Anne Street laboratory. There was an element of life-long exclusion under the covenant. The Court of Appeal held that the agreement was wider than necessary. Lord Cozens, Hardy and Lord Justice Phillimore (Lord Justice Swinfen Eady dissenting and considering the geographical restriction to be no greater than was reasonable for protection of Dr. Eastes) took the same kind of view as the Court of Appeal has now taken in the Okehampton case.

It is clear that the advisers of medical practitioners must keep these restrictive covenants in future as narrow as they conveniently can.

Reviews

LIPPINCOTT'S QUICK REFERENCE BOOK FOR MEDICINE AND SURGERY.—By G. E. Rehberger, A.B., M.D. Thirteenth Edition. 1946. J. B. Lippincott Company, Philadelphia and London. Pp. ix plus 1461. Illustrated. Price, 90s.

The first ten parts of this book deals with general medicine and surgery, gynaecology, genito-urinary diseases, obstetrics, diseases of skin, eye, ear, nose, and throat, and orthopaedics, and the last one with the

drugs mentioned in the body of the work—their dosage, uses and mode of administration. Treatment of diseases is the main feature of the book, but in preparing the present edition, the author seems to have overlooked some notable advances. For instance, there is no mention of penicillin in the treatment of syphilis, gonorrhoea, septicæmia or pneumonia; indeed all that we could find about this drug is in a short note in the section on drugs. In bacillary dysentery, prominence is given to saline treatment followed by bismuth and opium, while sulphaguanidine is just referred to as a remedy of 'proven value'. Thiouracil has a place in exophthalmic goitre but is not mentioned. Another matter on which we wish to comment is the long lists of causes of diseases; it must be a tedious process to go through them and we wonder whether they have any value at all. But apart from these shortcomings the book fulfils the needs of the general practitioners for whom it is primarily intended. Treatment of diseases has been given generally in greater detail than in similar textbooks, and the laboratory tests are described where required. In addition to diseases the book includes subjects such as infant feeding, metabolism, food, roentgenology and blood transfusion. Finally, there are chapters giving tests of drugs and equipments required for surgery or hospitals in the various specialities which the beginners will find very useful.

R. N. C.

PRACTICE OF MEDICINE (WRITTEN IN BENGALI):

—By Dr. Jotindra Nath Ghosal, L.M.S. Parts I and II. Published by B. Ghosal, 83, Karbala Tank Lane, Calcutta. Pp. 336. Price, Rs. 9 (in paper binding). Price, Rs. 10 (in cloth binding)

This book written in Bengali deals with the subject based on compilations from the literature and author's long experience in practice of medicine. It contains useful informations with interesting case notes, but it is not easy to read owing to incorporation of too many English terms spelt in Bengali such as constipation, paralysis, etc. Besides, there are many printing mistakes.

R. N. C.

AVIATION MEDICINE.—By Louis Hopewell Bauer.

Edited by H. A. Christian. 1943. (Reprinted from Oxford Loose Leaf Medicines.) Oxford University Press, London. Pp. 545 to 595. Illustrated. Price, 8s. 6d.

This little book which is reprinted from a section in Oxford Loose Leaf Medicines (with original page numbers 545-595) gives a concise account of physiology, internal medicine, ophthalmology, otology, neuropsychiatry and psychology which fall within the domain of the specialist in aviation medicine, now called the Flight Surgeon. All kinds of flights are considered.

The information given is for the benefit of both the pilot and the passenger. The medical officer of the air lines and the medical advisers of the air-minded sportsmen and travellers cannot do without it.

The description of the special apparatus used in testing candidates for training as pilots could be fuller. The 'ships' are really planes.

The paper, printing and binding are excellent and price reasonable.

S. D. S. G.

A HANDBOOK OF DISEASES OF CHILDREN.—By

B. Williamson, M.D., F.R.C.P. Fifth Edition. 1947. E. and S. Livingstone Ltd., Edinburgh. Pp. xii plus 408. 86 Illustrations, some in colour. Price, 15s.

This book is one of the handiest on the subject of children's diseases. The subject is treated system by system in a most readable form and there are 86 illustrations in the text. The treatment includes the use of biotics. Under Cooley's anaemia there is the mention of one authentic case in England. Von Jaksch's anaemia is no longer considered a clinical entity. The account of the Rh factor (p. 155) contains one



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S. D. K. G.

TEXTBOOK OF BIOCHEMISTRY.—By Benjamin Harrow, Ph.D. Fourth Edition. 1946. W. B. Saunders Company, Philadelphia and London. Pp. xiii plus 592. Illustrated. Price, 22s.

The fourth edition of Prof. Benjamin Harrow's book perhaps gives more than is really needed by a medical student but is welcome. Chapters on vitamins, immunochemistry, chemotherapy, inorganic metabolism and hormones are particularly arresting.

The paper, printing and binding are very good and the price is not excessive.

Teachers and laboratory workers must have a copy.

S. D. S. G.

VITAMINS IN HEALTH AND DISEASE.—By J. R. Goyal, M.B., B.S. 1947. Published by Dr. J. R. Goyal, Burn Bastion Road, Delhi. Pp. 166. Price, Rs. 5. (Obtainable from the Medical Review of Reviews, Post Box No. 160, Delhi)

This small book contains a concise account of vitamins and their uses including lists of articles of diet with their vitamin content especially intended for those practitioners who have no access to the literature. We may offer one comment. Although absence of thiamin deficiency in individuals with very poor intake is attributed to bio-synthesis in the large intestine as observed by Najjar and Holt, it is stated elsewhere that human body is unable to manufacture vitamins except certain amount of vitamin D.

R. N. C.

MATERIA MEDICA FOR NURSES.—By Lois Oakes, S.R.N., D.N., and Arnold Bennett, M.P.S. Second Edition. 1947. E. and S. Livingstone, Edinburgh. Pp. viii plus 354. Price, 7s. 6d.; postage, 6d. (Home)

This textbook on Materia Medica should prove most useful to all student nurses preparing for the State examinations as it is written in such an interesting and concise manner. In the second edition new chapters have been added dealing with sulphonamides and penicillin which greatly increase the value of the book. A nurse who knows something about drugs and their uses and effects finds her work much more interesting and is bound to prove a better and more useful nurse to her patients and the doctors. The editors have tried to meet the needs of nurses and have not made the book too difficult. It is strongly recommended for the use of sister tutors, trained nurses and student nurses.

W. J. M.

IMPROVISED EQUIPMENT IN THE HOME CARE OF THE SICK.—By Lyla M. Olson, R.N. Fourth Edition. 1947. W. B. Saunders Company, Philadelphia and London. Pp. 265. Illustrated. Price, 7s. 6d.

This book with its great number of illustrations is certainly unique and should find a place in every home and in every District Nurses' and Midwives' Library. The many up-to-date ideas on improvising articles to use for the comfort of the sick either in the home or in the hospital when the real article required is not available, are practicable and easy and should help to stimulate ideas of further ingenuity of all who use this book. The chapter on First Aid should be of interest to all nurses and mothers and those in charge of children among whom accidents so easily occur. The present book being the fourth edition proves that it has been very popular and useful.

W. J. M.

BOOKS RECEIVED

1. Nutrition. Bulletin No. 30. June 1947. Published by the Department of Food, Government of India, New Delhi. Pp. 32. Illustrated.

2. Food and Nutrition. Exhibition Number 1. Bulletin No. 31. July 1947. Published by the Department of Food, Government of India, New Delhi. Pp. 32. Illustrated.

3. Chronicle of the World Health Organization. Volume 1, No. 1-2. 1947. Development and Constitution of the W.H.O. United Nations' World Health Organization, Interim Commission, 350, Fifth Avenue, New York.

Abstracts from Reports

ANNUAL REPORT OF THE PUBLIC HEALTH COMMISSIONER WITH THE GOVERNMENT OF INDIA FOR 1945

FROM the year 1941 onwards, it became necessary to suspend publication of the full annual report of the Public Health Commissioner for various reasons, chief amongst them being the acute shortage of paper and printing facilities, diversion of some of the civilian staff to war work, recall to military duty of officers in civilian departments both from the Centre and the Provinces, difficulty in obtaining in time full reports of the provincial health activities, and lastly for reasons of security. Since the termination of the war last year, these difficulties are being gradually overcome. Brief reports for the years 1941, 1942, 1943 and 1944 have already been published. A preliminary note on the health conditions in British India during 1945 was published earlier this year as a new departure to provide a brief and early review.

Through the helpful co-operation of the Directors of Public Health of the Provinces it has been possible to obtain fuller reports of the work done during 1945. This report for 1945 is modelled more or less on the lines of the reports of the immediate pre-war years. It has not been possible, however, to publish it within six months of the end of the year to which it relates, which has been our objective in the past.

The year under review saw the termination of the global war first in the European and then in the Pacific Theatre. It left the world with widely devastated areas crying for rehabilitation, and a shortage of food and fuel supplies combined with difficulties of transport and communication. Under such circumstances the return to peace-time conditions could not be but slow. Malnutrition of populations on a scale not previously encountered could be expected. The threat of widespread world epidemics was apprehended. The pandemic of influenza in 1918-19 after World War I came readily to mind. In the United Kingdom the dreaded influenza did cause some alarm during the winter of 1945 but fortunately the worst fears did not materialize. In India, special watch was maintained at ports to check immediately any importation of influenza into the country. Spotting stations were organized in the provinces and a production of influenza virus vaccine was started on a preliminary scale at the King Institute, Madras.

In India, epidemics of cholera, smallpox and plague raged in a severer form than had been seen for many years past. Lack of sufficient medical personnel with the civil administration of the provinces and in some instances difficulties of supply of drugs and disinfectants hampered quicker control. In Bengal, some military medical units and personnel loaned from the army continued to render invaluable help to the civilian health authorities.

The control of epidemic diseases at fairs and large religious gatherings has improved by the insistence of some provincial authorities on pilgrims being previously

protected by inoculation. This measure has materially reduced the danger of spread of epidemic by the returning pilgrims.

War conditions had produced unprecedented expansion of aerial traffic to India especially through North Africa, and the danger of the introduction of yellow fever into India grew, since the arrangements that had been made at the outset of the war for the disinsection of infected planes before coming to India were becoming inadequate. The Government of India deputed two officers to study conditions and disinsection methods in North Africa. They reported that the disinsection arrangements for aircraft did not comply with all the conditions laid down by the Government of India. This resulted in the Government of India withdrawing recognition granted to disinsection certificates issued by any outside authority. The only disinsection certificates so far recognized had been those issued by the Egyptian and Sudan Civilian Authorities. These were, in consequence, no longer recognized with the result that any planes that had been to yellow fever infected areas were considered infected and all persons travelling in them and not holding valid yellow fever inoculation certificates had perforce to be quarantined at Karachi.

A review of the health conditions in British India during the year 1945 based on the monthly vital statistical returns received from the provinces has been made in the Preliminary Note which has been referred to in a previous paragraph. It is unnecessary to cover the same ground again. Recently, annual revised data for the whole year have been received from the provinces, though the data from some of them are still liable to slight alteration on final revision. These data generally support the remarks made on the health situation in the Preliminary Note.

The annual data referred to above show a total of 8,374,463 births in British India during 1945. This gives a birth rate of 27.3 per mille and indicates that the tendency towards a falling birth rate noticed in recent years may be lessening. During the quinquennium 1937-41 the maximum recorded birth rate was 34.5 per mille and the minimum was 32.0 per mille. In the years 1942 to 1944 it fell successively from 29.3 in 1942 to 25.9 in 1943 and 25.4 in 1944. In the year 1945 the birth rate increased by 1.9 per mille over the rate in 1944 but the birth rate in 1945 did not reach the normal level of the pre-war years. This increase in birth rate was shown by most of the provinces which had recorded a marked fall in birth rate in the previous years. The United Provinces, Bihar, Orissa, Bengal, Ajmer-Merwara, the Central Provinces and Delhi all showed a clear increase in birth rate. The rates in all these provinces with the exception of the last two were still much below the pre-war level. The highest increase was shown by Bengal from the low birth rate of 15.6 per mille in 1944 to 20.8 per mille in 1945. A decrease compared to the 1944 rate was nowhere considerable except in the case of Sind where the birth rate fell from 14.5 per mille in 1944 to 13.6 in 1945, but the Sind figures must be regarded with caution as being partly due to inefficient registration. The North-West Frontier Province and the Punjab showed a further slight decrease this year. The position in the remaining provinces, *viz.* Bombay, Madras, Coorg and Assam, did not show much variation over that in 1944. During the year 1945, the Punjab, Delhi and the Central Provinces continued their record of a birth rate well over 35 per mille. As has been remarked in the Preliminary Note the decrease in birth rate in British India in the recent years is a subject of considerable interest particularly in view of the last intercensus rate of increase in British India which gave rise to apprehensions of a fast increasing population.

On the other hand, the death rate for British India decreased from 24.1 per mille in 1944 to 21.5 in 1945. The total recorded deaths in 1945 were 6,608,766. In the quinquennium 1937-41 the maximum death rate was 24.3 per mille and the minimum was 21.1. The rates from 1942 to 1944 were 21.3, 23.6 and 24.1

respectively. The death rate in 1945 decreased by 2.6 per mille compared with the rate in 1944. A substantial fall in death rate from the 1944 rate was shown by the North-West Frontier Province, Punjab, Delhi, Bihar, Orissa, Bengal, Sind, Madras, Coorg and Assam. Here again the largest decrease was shown by Bengal which fell from a rate of 28.1 per mille in 1944 to 19.8 in 1945. Only the Central Provinces showed an abnormal rise from 30.0 per mille in 1944 to 39.1 in 1945. The death rates in Bombay and Ajmer-Merwara showed some increase. The position in the United Provinces was very much the same as in 1944. With the exception of the Central Provinces and Orissa, the death rates in 1945 were on the same level as in the pre-war years; in fact in some provinces the rates were markedly below that level.

The infantile mortality rate showed a marked decrease. Infant deaths in British India totalled 1,264,003 in the year giving an infantile mortality rate of 150.9 per 1,000 live births as against the rate of 169.3 in 1944. The rate in 1944 was the highest recorded in the last decade while the rate in 1945 was the lowest recorded in the same decade, and, in fact, is the lowest on record for British India. With the exception of the Central Provinces and Coorg, which recorded an increase, every other province showed a decrease in the infant mortality rate. In the cases of the United Provinces, Bihar and Bombay, the decrease was not so marked as in others. The rate in the Central Provinces was 256.6 per 1,000 live births and was the highest recorded in the last decade. In Coorg, the rate had come down markedly low, that is for Indian conditions, in 1943 and 1944 to the figure of 122 and 121 respectively. In 1945 the rate increased to 130.9 but this figure is still much below the rates obtaining prior to 1943.

The public health activities of the provinces continued to be markedly curtailed due to war-time difficulties of obtaining personnel and material. Consequently, no large-scale improvements in the public health conditions of the towns or villages could be undertaken. The teeming millions of the rural population in India still remain more or less unprovided with medical and public health amenities.

The vast needs of the immediate post-war years were looming large and both Provincial and Central Governments produced comprehensive and detailed plans for the development of widespread public health facilities as well as medical relief.

The completion of the work of the Health Survey and Development Committee under the chairmanship of Sir Joseph Bhore during the year is an event of unique importance. Such a wide survey for a country of this size is an achievement of note. For the first time an authoritative survey of the health conditions in India has been made available. Its recommendations are far-reaching. It lays stress on focusing attention on the early advancement of the vast and hitherto neglected rural areas. It envisages a State Health Service which combines the curative and the preventive aspects into one organization.

REPORT OF THE KASHMIR MEDICAL MISSION OF THE CHURCH MISSIONARY SOCIETY FOR THE YEAR 1946

THE year 1946 has been a difficult one on account of a very depleted staff and high prices in Kashmir. During the year over 2,000 medical and surgical cases were treated as in-door patients and more than 550 major operations and 2,000 minor ones were performed. The out-patient attendance was less than in the previous year which is attributed to various reasons, one of them being political disturbances in the State. There was an outbreak of cholera late in the year, but with the approach of cold weather, it did not assume severe proportions. The annual expenditure was over Rs. 63,000, while donations, subscriptions and offertories received amounted to a little over Rs. 13,000.

All who are interested in the work are requested to send their donations or subscriptions to the Mission.

R. N. C.

ANNUAL REPORT OF THE CHEMICAL EXAMINER'S DEPARTMENT, GOVERNMENT OF MADRAS, FOR THE YEAR 1946

THE total work of the department during the year amounted to investigation of 1,781 cases with 8,812 articles as compared with 1,639 cases with 8,347 articles in the previous year. There were 527 cases of alleged human poisoning, poison being detected in 210 (39.8 per cent). The commonest poisons detected were alcohol in 35, oleander in 25, datura in 22, opium in 22 and cyanide in 18 cases. The number of stain cases examined increased from 953 in 1945 to 1,021, while miscellaneous medico-legal cases involving the examination of firearms, explosives and other articles decreased from 112 to 107. The report contains a number of illustrative case notes.

R. N. C.

REPORT OF A MEETING OF THE ROSS INSTITUTE INDUSTRIAL ADVISORY COMMITTEE, LONDON, HELD ON 14TH FEBRUARY, 1947

At the seventeenth meeting of the committee held in London on the 14th February, the chairman, Mr. A. Wigglesworth, referred to the reorganization of the India branch, formation of a new branch in East Africa, housing in the tropics and investigation of the new insecticide gammexane that is now being carried out. Professor G. Macdonald, Director of the Institute, gave an account of the experiences of a recent tour in India in which he said that there was a general deterioration of health of the tea plantation labour which reached its lowest level in 1943. It was due to a variety of causes, e.g. poor nutrition, rationing, food distribution and changing economic conditions. The major disease problems in the estates are, he said, malaria, kala-azar, anaemia, respiratory and alimentary infections. In addition there are of course the problems of water supply, sanitation and housing. In the control of malaria there have been many successes and also some failures. The chief causes of failure were: (1) imperfect organization of anti-malaria work, (2) existence of unrecognized causes of malaria, (3) undue reliance on one single method of malaria control, (4) shortage of trained staff, and (5) administrative difficulties. The new insecticides and drugs should be of very real advantage and can be brought into immediate use; but Prof. Macdonald was concerned to find that DDT had not become generally available for industrial use and that formulations of DDT were starting to appear in quantity at the time of his visit; the latter make less effective larvicides. Not much is at present known of gammexane, but the results so far obtained are most promising. The value of mepacrine has proven on estates before the war, but paludrine has advantages over mepacrine and should control malaria in the dosage of two tablets per week at intervals of 3 to 4 days. In the control of kala-azar, too, the new insecticides may provide a solution to the problem, having a very potent effect on the sandfly.

Anaemia has become commoner than it was and is a problem of first importance. It is very much more common in places where there is a considerable mixture of new and old resident coolies, and he thinks that the mixing of different strains of infection might have some influence on its production. There is an undoubted nutritional factor; the effect of food rationing and control has been to accelerate the departure from home-pounded rice which contains four times as much iron as does highly milled rice. In addition the prices of some of the accessory foods have gone beyond the labourers' ability to pay for them. Prof. Macdonald does not believe that hookworm infection plays as important a part in the production of anaemia as it is

stated by some. There has been a marked tendency for increase in the more serious forms of respiratory infections such as pneumonia, most probably because the cloth is rationed allowing many labourers no change when they are out, and umbrellas are now almost unobtainable so that they get wet more frequently and thoroughly. Of the alimentary infections, amebic and bacillary dysentery is very common, but a great deal has been done by installation of pure water supplies; still other channels of entry such as direct contamination or contamination by flies remain. The bore-hole latrine has not proved successful in Assam owing to high water table.

Dr. R. F. Tredre spoke on health problems in Gold Coast mines where the African labourers usually arrive in a state of sub-nutrition, coming as most of them do from territories in which there is a definite shortage of food. They have a difficult time during the first year and are liable to contract respiratory diseases which are unquestionably the principal cause of sickness on the mines. Hookworm and bilharzia infestations are very common but malaria is not of much consequence, as a considerable degree of immunity develops after adolescence. Better amenities are now being provided in the way of canteen feeding, etc. Mr. P. J. Burgers spoke of malnutrition among the labouring groups in Malaya from the absence of their customary amount of rice, the present rate of which is only about $\frac{1}{2}$ lb. per day against $1\frac{1}{2}$ - $1\frac{1}{2}$ lb. which they were getting before the war. This is said to be one of the primary causes of industrial unrest. It seems that Malaya is not getting the expected supplies of rice from Siam. Finally Professor G. P. Crowden said a few words on thermal protection by whitewash. To begin with, whitewash absorbs only a small proportion of the energy in direct sunlight, hence when it is applied to exposed exterior surface of roofs and walls it lessens the penetration of solar heat during the day with the result that less thermal discomfort is caused by re-radiated solar heat by day and at night. Experiments have shown a lowering in this way of inside surface temperature of bedroom walls by 3 or 4 degrees F., or more at night.

R. N. C.

Correspondence

PLAGUE CONTROL

SIR,—Elimination of the rat is one of the fundamental planks in plague control. Trying to tackle the problem in U.P. in 1946 and modifying the method in Mymensingh in 1947 I found the following procedure to be highly successful and economic too.

Some sticky substance like oil or molasses as it is, or diluted with water is to be placed in the opening of the rat hole or along the haunts of the rat, like corners of the room behind furniture and bales of food grains and holds of godowns and ships.

On the sticky substance is to be sprinkled lightly, sodium antimony tartrate powder or copper sulphate powder, that is an irritant. In village experiment, I used dried and powdered dhatura-belladonna leaves too, with copper sulphate. The result every time was the disappearance of the existing rat population from the place for a considerable period.

Yours, etc.,

N. Z. KHAN, M.B.,
MAJOR, I.M.S. (ex).

CALCUTTA.

ANTIBIOTICS

SIR,—Being engaged in a research scheme on 'Certain aspects of penicillin and other antibiotics' for the past two years in this department under the auspices of

the C.S.I.R., India, I had naturally read with great interest the editorial on 'antibiotics' published in the December 1946 issue of the *I.M.G.*, pages 537-38, and thus had occasion to note the mention you had just made about *Allicin*. Again it was interesting to read the letter by S. N. Gupta, appearing in the April 1947 issue of the journal, page 241, and the abstracts of the papers he had sent you. In this connection I would like to draw your attention to the fact that, we in this department were engaged in a detailed study of plant antibiotics and among them *allicin*. Besides evolving a neat and elegant method of obtaining *allicin* in a very pure state, and studying several of its biochemical and physiological properties, we were also able to demonstrate its remarkable antibacterial effect on acid-fast organisms like *M. tuberculosis*. Results of our earlier work have appeared in a note in *Nature* (157, 1946), and in a paper in *J.S.I.R.* (46, 1946), both of which are summarized.* The work on various other aspects regarding *allicin* as a general chemotherapeutic agent such as toxicity studies in animals, blood level tests, and ability to cure experimental tuberculosis infection in animals, etc., etc., is nearing completion and it is hoped will be ready for publication in the near future.

Yours, etc.,

R. RAGHUNANDANA RAO.

DEPARTMENT OF BIO-CHEMISTRY,
INDIAN INSTITUTE OF
SCIENCE, BANGALORE.

* R. Raghunandana Rao, S. Srinivasa Rao, S. Natarajan and P. R. Venkataraman. Inhibition of *Mycobacterium tuberculosis* by garlic extract. *Nature*, 157, 441, 1946. The following is an extract:

We prepared an antibiotic extract from *Allium sativum* Linn. by a slight modification of the method of Cavallito and co-workers, who found it to be effective against Gram-positive and Gram-negative organisms. In our experiments, *Mycobacterium tuberculosis* (human strain B 52, H., Kasauli) was employed as test organism for *in vitro* and *in vivo* studies. In the first group of experiments, flasks containing Long's medium (with ammonium malate instead of asparagine) with the extract in the form of emulsion so as to give concentrations of 2 mg., 6 mg., 12 mg., and 18 mg. per 100 c.c. of the media were inoculated with two loopfuls of *Mycobacterium tuberculosis* from a slant culture and incubated. No growth was observed after three weeks in any of the flasks containing the extract, while in the control the bacillus grew profusely. In the containing 2 mg. garlic extract per c.c. slight curdy submerged growth was observed from the fourth week onwards; but it was very slight and slow. This was confirmed by repeated experiments.

We then inoculated 17 c.c. of Long's malate media containing 6.5 mg. of extract per c.c. in the form of emulsion with three loopfuls of the bacillus from a slant culture and incubated it for 24 hours with a control similarly prepared but without the extract. Sub-cultures were made from the two samples on Dorset's egg media, and 2 c.c. portions were injected subcutaneously in the groin region into guinea-pigs. After four weeks, no growth was observed in the sub-cultures from the tube containing garlic extract, while there was good growth in sub-cultures from the control tube. The animals are under observation at present.

In the light of the above observations, garlic extract *in vitro* is bacteriostatic in low concentration and probably bactericidal in high concentrations. Experiments are now in progress to test the efficacy of the extract in guinea-pigs immediately after infection.

R. Raghunandana Rao, S. Srinivasa Rao and P. R. Venkataraman. Investigations on plant antibiotics. Part I—Studies on *allicin*, the antibacterial principle of *Allium sativum* (garlic). *Jour. Sci. and Indust. Res.*, 5B, No. 2, 31-35, 1946. The authors' summary is given below:

The antibacterial principle of garlic has been prepared from the cloves by a comparatively simple process.

The antibacterial action against typical Gram-positive, Gram-negative and acid-fast bacilli has been demonstrated. It exhibits also antifungal properties.

The stability of *allicin* in the presence of artificial gastric and pancreatic juices and blood has been studied. While the antibiotic is comparatively stable in the presence of blood and gastric juice, it is inactivated by artificial pancreatic juice.

The inhibiting action of *allicin* on the milk clotting activity of papain and the amylolytic activity of B-amylase seems to indicate that it probably acts by reacting with —SH enzymes of tissues.

BACK NUMBERS OF THE I.M.G.

SIR,—There must be at least some of your readers who do not destroy their copies of the *I.M.G.* after they have read them. Since almost all the important work in India has been published in the *I.M.G.*, we frequently find ourselves frustrated as we have no volumes prior to 1935. Could any subscribers please help us with numbers of the *Indian Medical Gazette*, either bound or single copies, prior to 1935? We are anxious to have complete files, at least back to 1925. If any one would donate or sell us back numbers, we should be most grateful. In either case the College would pay postage. Please communicate with the Librarian.

Yours, etc.,

J. DONALD BALL, M.B.
M.R.C.P. (Lond.),

Actg. Medical Superintendent.

CHRISTIAN MEDICAL
COLLEGE, VELLORE.

GROUNDNUT CAKE FOR HUMAN CONSUMPTION

SIR,—I am writing to express my delight on seeing that, with Dr. Daver's article in the May 1947 issue, the *I.M.G.* has taken up the cause of groundnut cake flour for human consumption. I consider this a matter of greatest national importance and hope that you will continue to champion this cause with the full weight of the scientific authority of which the *I.M.G.* is a mouthpiece. Though I have hitherto refrained from emerging into scientific print, I have during the last four and a half years been intensively occupied with the subject. During this time I have, largely in vain, tried to create an appreciation of the fundamental importance of the nutritional and economic questions involved.

Mixed with cereals or pulses in proportions as suggested by Daver the 'nutty' flavour of edible groundnut cake is practically imperceptible. In numerous experiments in which such mixtures were offered as food to persons who did not know the composition of what they were eating it was not once detected. Regularly such persons—and they were from every walk of life—when offered the plain and the nut flour containing preparation claimed to prefer the latter. So much for the 'smell'.

The common belief that groundnut cake produces diarrhoea is based on 3 different facts of which Daver mentions one—the adulteration in an unclean press with castor oil. The second reason is that during a temporary food shortage the ordinary commercial cake is sometimes eaten. This definitely produces diarrhoea owing to an adulteration of the cake with fragments of the outer shell and hard grit which the miller adds in order to get a better 'grip' in his expeller and consequently an higher yield of oil. These hard sharp-edged particles set up a mechanical irritation in the bowel. Diarrhoea never occurs when clean kernels only are used. Finally, if whole nuts are consumed in large quantities as during the harvesting season by persons whose fat digestion is impaired owing to a lack of vitamin B, particularly nicotinic acid, a sudden excess of vegetable fat may lead to diarrhoea. This, of course, does not apply to the cake from which most of the oil has been removed.

There can be no doubt whatsoever that by every known scientific standard edible groundnut cake is the finest all round human vegetable food produced in this country, with the special advantage of being so incredibly rich in high-grade protein (50 per cent as compared with mutton's 35 per cent) that it is just what is needed in a country where protein deficiency is the outstanding feature of malnutrition. The groundnut proteins have, according to Dr. B. G. S. Acharya, who very kindly conducted rat feeding experiments in the Garutman Laboratories, Bombay, at my request, a very high digestibility coefficient (91.44). With about 7 per cent fat, 31 per cent carbohydrates and a high mineral and vitamin content groundnut cake is a beautifully balanced food with which to enrich cereals and pulses. In spite of its high protein content it has the same caloric value as wheat and jowar.

That this superfood is used in an underfed country as a fertilizer to produce sugarcane and other money crops seems utterly incomprehensible. Plants can assimilate and thrive on inorganic chemical fertilizers which we cannot; they can feed on dung which we cannot. Why then feed them with potential human food? We cannot digest cotton seed, cattle can. Yet we feed our cattle with large quantities of what we might eat ourselves, with a perfect, ready-made, human food in order to induce them to transform a small fraction of the offered nut protein into milk protein and a little perfectly good vegetable fat into animal fat in the form of butter. This is a ruinous and wasteful luxury which even the richest and best-fed country should hesitate to allow and which in India can only be described as suicidal.

A ton of groundnut cake is equivalent in protein food value alone to a flock of 50 sheep, to 50,000 eggs, to 15,000 seers of milk and India produces annually about seven lakhs of tons. A farmer who ploughs a ton of groundnut cake into his field is actually burying enough protein to cover all the requirements of his family for a whole year. He might with as much sense of nutritional economy slaughter and bury his goats and sheep and pour all the milk his cows produce on his fields to grow tobacco. In addition to the proteins, ready-made fats, starch, vitamins laboriously prepared by the groundnut plant are buried only to be broken down again into the simple chemicals the plants can utilize. This sheer waste of biological energy is stupendous.

We read and hear much about food yeast and the soya bean. The one requires an industrial plant and the other good land, neither are now produced on a large scale while huge quantities of groundnut cake which would serve an identical purpose are already available. With some minor changes in processing it can be made edible. It is also cheap and its use for human food would in no way dislocate the oil industry, in fact, it would improve it.

The sudden opening up of this new source of cheap high-grade protein, mineral and vitamin food would undoubtedly have a profound influence on the nation's nutrition, its health and its vital statistics.

Yours faithfully,

A. T. W. SIMEONS, M.D.

BOMBAY.

PROGRESSIVE MUSCULAR ATROPHY

Sir,—Reference to my letter about a case of 'Progressive muscular atrophy' in your April number, page 241.

The only further symptom, during these few weeks, has been :—

Mild pains in the deltoids (alternately) and in the extensor muscles of the head. Injections of strychnine gr. 1/20 and vitamin B, 50 mg. every three or four days are continued, apparently doing much good.

Yours faithfully,

A. OMAR.

GONDA, U. P.,
13th August, 1947.

Any Questions

NOVOCAINE TREATMENT OF OSTEOARTHRITIS

Sir,—I am giving below a copy of an article I came across in *News Review*.*

Will you very kindly let me know if to your knowledge and experience intravenous administration of novocaine affords relief in arthritis. If so, please let me know in what strength the novocaine has to be administered and what types of arthritis are liable to be benefited the most.

I am, etc.,

H. C. JAIN, M.B., B.S.

CHANDAN NIWAS,
AJMER.

A way to relieve the crippling agonies of arthritis has been discovered by Drs. Joseph Kovacs and David Granband of New York Reconstruction Hospital. Their method is to give intravenous injections of novocaine one, two or three times a week according to the form of the disease and the state of the patient.

Cautions by the doctors say that the treatment is no more a cure for arthritis than aspirin for the causes of headaches. Moreover, unless the drug is administered with great care, the patient is liable to get convulsions.

But their discovery has value. Relief of pain is an important stage in the treatment of arthritis. It gives the patient more mobility and brighter mental outlook. Startling and gratifying is how the doctors describe their success in dimming the pain.

[Ernest Fletcher in his 'Medical disorders of the locomotor system' (E. and S. Livingstone Ltd., Edinburgh, 1947), page 336, mentions the novocaine treatment of osteoarthritis as follows :—

'Novocaine (procaine) has been used as a joint injection in a great many cases. The usual strength is $\frac{1}{2}$ per cent and the quantity for a knee is 10 c.c. There is no doubt that pain is entirely relieved for a period. The duration of this period varies from four hours to a day. Succeeding injections as a rule are followed by prolonged periods of freedom, and in a very large number of cases, the pain may cease entirely for months. A good plan is to continue the injections, after the pain has been relieved, once every month or six weeks. Naturally enough the rationale is not understood, but the result attained follows the pattern obtained in other parts of the body, where the temporary interruption of pain sensation may in fact become permanent or semi-permanent, although the original pathological stimulus is not affected. It matters little from the point of view of treatment whether the explanation is really of a psychological character.'—Editor, *I.M.G.*]

DHATURA STRAMONIUM SEEDS IN WHEAT

Sir,—Could you answer the following :—

1. Is a stock of wheat containing up to 0.6 per cent dhatura stramonium fit for human consumption?
2. What is the minimum percentage of this seed which should render the wheat unfit for human consumption?

Yours, etc.,

R. B. LAL.

ALL-INDIA INSTITUTE OF HY-
GIENE AND PUBLIC HEALTH,
CALCUTTA.

[Taking the average consumption of wheat per head to be 250 gm., the total quantity of dhatura stramonium seeds contained at the rate of 0.6 per cent will be 1.5 gm. or 1/20 grain of the alkaloids (0.186 per cent of the seeds). This amount is three times the therapeutic dose which is 1/240 to 1/60 grain. The wheat is thus not fit for human consumption.—J. C. G.]

* Relief for arthritis, *News Review*, 5th June, 1947, page 19, column 4.

PENICILLIN IN TUBERCULOSIS OF LUNGS AND JOINTS

SIR,—Please discuss the use and contra-indications of penicillin in cases of tuberculosis of lungs and joints in your journal.

Yours, etc.,

M. ABDULLA, L.C.P.S., L.M.S.

THE NURSING HOME,
VANIYAMBADI
(NORTH ARCOT).

(Penicillin has not been found to be of much use in the treatment of diseases caused by *Mycobacterium tuberculosis*.—A. C. U.)

Service Notes

APPOINTMENTS AND TRANSFERS

COLONEL K. S. MASTER, M.C., K.H.P., is appointed Colonel Commandant of the Indian Army Medical Corps.

On return from one month's leave, Colonel L. K. Ledger, C.I.E., O.B.E., assumed charge of the office of the Inspector-General of Civil Hospitals-cum-Director of Public Health, C.P. and Berar on 11th June, 1947, and Lieutenant-Colonel A. S. Garewal, Inspector-General of Prisons, C.P. and Berar, ceased to hold the additional charge of Inspector-General of Civil Hospitals, C.P. and Berar, from the same date.

The Viceroy and Governor-General has been pleased to make the following appointments on His Excellency's personal staff :—

Honorary Surgeons

24th March, 1947

Colonel V. N. Agate.	Colonel J. R. Kochhar.
Colonel E. Cotter.	Colonel S. M. A. Faruki.
Colonel D. Clyde.	Colonel S. L. Bhatia, C.I.E., M.C.

LEAVE

Captain T. P. Binns, Medical Officer and His Britannic Majesty's Acting Vice-Consul, Kashgar, is granted leave on average pay for 4 months and 15 days (including additional leave for 1 month and 2 days) combined with leave on half-average pay for 8 months and 17 days with effect from the 19th October, 1946.

Lieutenant-Colonel K. S. Fitch, O.B.E., Additional Deputy Director-General, Indian Medical Service (Resett.), is granted leave ex-India on average pay for 8 months combined with leave on half-average pay for 4 months with effect from the 16th January, 1947.

PROMOTIONS

Major-General Sir James Hennett Hance, K.C.I.E., O.B.E., K.H.P., is granted the local rank of Lieutenant-General without effect on pay and pension whilst holding the appointment of Medical Adviser to the Secretary of State for India and President of the India Office Medical Board. Dated 29th July, 1946.

Colonel to be Major-General

K. S. Master, M.C., K.H.P. Dated 27th May, 1947.

Majors to be Lieutenant-Colonels

6th April, 1946

D. P. Lambert.	A. K. M. Khan.
B. M. Rao.	S. S. Bhatnagar.
B. N. Hazra.	B. Chaudhuri.
R. M. Lloyd-Still.	H. L. Datta.
A. Singh.	A. V. O'Brien.
K. F. Alford.	S. T. Davies.
S. C. Bakhle.	L. Dass.
P. J. Kelly.	S. M. K. Mallick.
E. M. Sewell.	T. C. Puri.
W. F. Cooper.	C. Mani.
A. N. Duggal.	R. R. Bakhshi.

H. W. Farrell, O.B.E.	G. R. M. Apsey.
B. D. Khurana.	B. Temple-Raston.
L. G. Backhurst.	A. K. Gupta.
Jaswant Singh, O.B.E.	V. E. M. Lee.
P. C. Dutta, O.B.E.	G. B. W. Fisher.
E. A. R. Ardeshir.	E. P. N. M. Early.
H. S. Waters.	S. Lal.
G. Milne.	D. Tennant.
C. F. J. Cropper, O.B.E.	D. P. Mitra.
E. S. S. Lucas.	N. J. U. Mather.
J. P. J. Little.	T. D. Ahmad.
E. A. O'Connor.	M. Jafar.
P. L. O'Neil.	B. N. Khan.

P. P. Chowdhury.

Captains to be Majors

1st May, 1947

R. Y. Taylor.	N. D. Jekyll.
W. W. Coppinger.	E. J. Somerset.
D. M. Black.	L. D. B. Frost.

A. M. Mackenzie, O.B.E.

F. C. Griggs. Dated 10th June, 1947.

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captains to be Majors

J. J. Eapen. Dated 5th September, 1946.
K. V. Ganapathi. Dated 6th January, 1947.
F. M. F. Forrest. Dated 20th January, 1947.
R. C. B. Sule. Dated 6th February, 1947.
V. S. Bhattal. Dated 5th March, 1947.
A. Kidvai. Dated 6th March, 1947.
R. S. C. Banerji. Dated 24th March, 1947.

INDIAN MEDICAL SERVICE

SECONDED FOR SERVICE WITH INDIAN AIR FORCE

(Emergency Commission)

Captain to be Major

N. H. Convala. Dated 6th March, 1947.

RETIREMENTS

Lieutenant-Colonel J. M. Mitchell, O.B.E., 25th June, 1946, and is granted the honorary rank of Colonel.

Major B. M. Wheeler receiving a gratuity, 10th October, 1946.

Lieutenant-Colonel L. G. Pearson, 24th October, 1946.

Major-General Sir J. B. Hance, K.C.I.E., O.B.E., K.H.P., 12th November, 1946.

Lieutenant-Colonel N. M. P. Dotiwala, M.C., 1st June, 1947.

RELINQUISHMENTS

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Lieutenant-Colonel. His services are replaced at the disposal of the Government of Punjab, with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Lieutenant-Colonel S. S. Grewal, M.B.E. Dated 9th July, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Lieutenant-Colonel. His services are placed at the disposal of the Government of Bombay, with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Lieutenant-Colonel Archie Norman Dequadros. Dated 29th August, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service

and are granted the honorary rank of Lieutenant-Colonel :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Ty. Lieutenant-Colonel K. S. Ramaswami. Dated 21st January, 1947.

Ty. Lieutenant-Colonel B. A. Lamprell. Dated 13th March, 1947.

Ty. Lieutenant-Colonel S. D. N. Sinha. Dated 15th March, 1947.

Major M. Krishnamurthi. Dated 6th April, 1947.

Ty. Lieutenant-Colonel P. P. V. George. Dated 27th April, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are placed at the disposal of the Government of India, Department of Health, with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Major Hardev Prasad Mehta. Dated 2nd September, 1946.

The undermentioned officer is permitted to relinquish his commission on grounds of ill health and is granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Major Raman Raghavan. Dated 2nd July, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Major V. P. Rao. Dated 26th September, 1946.

Captain Kallankaudeth Narayanan Kutti Menon. Dated 7th November, 1946.

Ty. Major Krishnadian Banerjee. Dated 18th November, 1946.

Ty. Major Manoranjan Ray. Dated 25th November, 1946.

Ty. Major Joachim Mathias Pinto. Dated 2nd January, 1947.

Major Kakumanu Vullakki. Dated 6th February, 1947.

Ty. Major Govindan Sambasivan. Dated 6th March, 1947.

Captain Tarak Das Chatterjee. Dated 8th March, 1947.

Major Mohammad Ibrahim. Dated 19th March, 1947.

Major V. L. Parnaik. Dated 20th March, 1947.

Captain B. G. Achar. Dated 12th April, 1947.

Major S. K. Roy. Dated 4th May, 1947.

Ty. Major B. N. Blaggan. Dated 10th May, 1947.

Ty. Major M. Natarajan. Dated 13th May, 1947.

Ty. Major A. Minhas. Dated 24th May, 1947.

Major Bibhuti Bhusan Chatterjee. Dated 24th May, 1947.

Ty. Major Jal Framroze Bhajiwalla. Dated 27th May, 1947.

Ty. Major Walter Stephen Hart. Dated 27th May, 1947.

Ty. Major K. P. Bhargava. Dated 27th May, 1947.

Major Mukund Balvantrai Thakure. Dated 31st May, 1947.

Major Mammen Mammen. Dated 1st June, 1947.

The undermentioned officer is permitted to relinquish his commission on reversion to I.A.M.C. (S.M.S.) :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain Albert James Cadogan. Dated 17th February, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of the Punjab, with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain Mohammad Afzal Sheikh. Dated 4th April, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of the Central Provinces and Berar, with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain Shri Madhava Vasudeo Tungar. Dated 9th May, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are placed at the disposal of the Government of N.-W. F. P., with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain Shad Mohd. Khan. Dated 13th March, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captain P. Oommen. Dated 9th February, 1946.

Captain J. N. Mukherjee. Dated 30th April, 1946.

Captain P. P. Balkrishnan. Dated 9th July, 1946.

Captain S. Chakravarti. Dated 26th July, 1946.

Captain H. P. Banerjee. Dated 26th September, 1946.

Captain M. Bhattacharjee. Dated 8th November, 1946.

Captain C. M. Chandwani. Dated 28th November, 1946.

Captain B. B. Bhadury. Dated 1st January, 1947.

Captain A. M. Kassim. Dated 10th January, 1947.

Captain (Miss) Siloo Sorabji Daruvala. Dated 13th January, 1947.

Captain R. C. Mitra. Dated 18th February, 1947.

Captain B. S. Manocha. Dated 22nd February, 1947.

Captain R. Kumar. Dated 17th March, 1947.

Captain A. K. Dawn. Dated 27th March, 1947.

Captain B. Mukherjee. Dated 29th March, 1947.

Captain N. K. Mukherjee. Dated 30th March, 1947.

Captain K. S. P. S. Dave. Dated 13th April, 1947.

Captain J. Maitra. Dated 16th April, 1947.

Captain Shree Krishna Narayana Sinha. Dated 4th May, 1947.

Captain Vikhari Ekambaram. Dated 7th May, 1947.

Captain Rafique Ahmad Riyaz. Dated 10th May, 1947.

Captain Pillalamarri Jagannathan. Dated 14th May, 1947.

Captain (Miss) Kamla Nihal Chand Lai. Dated 23rd May, 1947.

Captain Mohd. Zahir Abid. Dated 30th May, 1947.

Captain Srinivasa Banganathan. Dated 30th May, 1947.

Captain Sushil Kumar Bhaumik. Dated 7th June, 1947.

Captain Varikaravadakaveetil Chathukutty Nayanar. Dated 21st June, 1947.

(WITHIN INDIAN LIMITS)

Captain S. S. Hazra. Dated 27th October, 1946.

Captain Debi Prasad Lahiri. Dated 16th March, 1947.

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INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
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 Captain Sharatehandra Laxman Abhyankar. Dated 29th May, 1946.
 Captain Sheik Abdul Rahim. Dated 26th August, 1946.
 Captain Charu Bhavanishankar Bhargav. Dated 31st August, 1946.
 Captain Mumtazuddin Ahmad Baqai. Dated 2nd October, 1946.
 Captain Cyril Joseph Pinto, M.C. Dated 27th October, 1946.
 Captain Peter Ian Atkinson. Dated 30th November, 1946.
 Captain Prabhas Kumar Sen. Dated 7th December, 1946.
 Captain Niranjan Choudhury. Dated 8th December, 1946.
 Captain Prithvi Raj Sondhi. Dated 9th December, 1946.
 Captain Amal Kumar Das Gupta. Dated 23rd December, 1946.
 Captain Amulya Ratan Roy. Dated 1st January, 1947.
 Captain Arabinda Chatterjee. Dated 14th January, 1947.
 Captain Bandaru Seshagiri Row. Dated 30th January, 1947.
 Captain Riaz-Ud-Din Quraishy. Dated 25th February, 1947.
 Captain Santosh Kumar Mukherjee. Dated 16th March, 1947.
 Captain Mohammad Ali. Dated 26th March, 1947.
 Captain Saroj Kumar Sen. Dated 26th March, 1947.
 Captain Hemanta Kumar Das. Dated 31st March, 1947.
 Captain Kapil Deva Malaviya. Dated 1st April, 1947.
 Captain Jesudoss Jothinayagam Barnes. Dated 1st April, 1947.
 Captain Puvadan Thayyan Balrama Varma. Dated 2nd April, 1947.
 Captain Salahuddin Ahmad Mallick. Dated 3rd April, 1947.
 Captain Ali Mohmad. Dated 6th April, 1947.
 Captain Kalyan Kumar Lahiri. Dated 10th April, 1947.
 Captain Tinnevely Sundaresan Canapati. Dated 20th April, 1947.
 Captain Nagaswami Subramanyam. Dated 20th April, 1947.
 Captain Ramesh Chandra Chakravarti. Dated 21st April, 1947.
 Captain Natarajan Venkataraman. Dated 22nd April, 1947.
 Captain Varada Ananda Damodaram. Dated 25th April, 1947.
 Captain Santosh Chandra Maitra. Dated 27th April, 1947.
 Captain Kalpathy Doraswamy Veeraraghavan. Dated 11th May, 1947.
 Captain Hanumanta Rao Padmanabhan. Dated 21st May, 1947.
 Captain Harihar Chandra Ghosh. Dated 22nd May, 1947.
 Captain Laxmi Narayan Ganti. Dated 22nd May, 1947.
 Captain Anil Kumar Chatterjee. Dated 27th May, 1947.
 Captain Aiylam Rangaswami Anantaraman. Dated 15th June, 1947.
 Captain Joseph George. Dated 15th June, 1947.

(WOMEN'S BRANCH)

- Captain (Miss) Louisa Mary D'Silva. Dated 11th July, 1946.
 Captain (Mrs.) Susheila Pujari (nee Narasappa Manoharabai). Dated 17th February, 1947.

Captain (Miss) Teresa Dominic. Dated 10th May, 1947.

(WITHIN INDIAN LIMITS)

Captain Amirdasami Kanagaraj. Dated 19th August, 1946.

Captain Kamarazu Surya Narayana Rao. Dated 5th March, 1947.

The undermentioned officers are permitted to relinquish their commissions on grounds of ill health and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

- Captain V. Sankariah. Dated 24th October, 1946.
 Captain Manakkampad Vasunny Nayar. Dated 25th April, 1947.

(WITHIN INDIAN LIMITS)

Captain Indra Narayan. Dated 16th November, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Flight-Lieutenant :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

- Captain (Ft.-Lt.) Gobichettipalayam Nageswara Iyer Venkatraman. Dated 21st August, 1946.
 Captain (Ft.-Lt.) Hemendra Nath Sen. Dated 17th April, 1947.

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TREATMENT OF RELAPSING MALARIA WITH SPECIFIC ANTIMALARIAL DRUGS IN COMBINATION WITH PENICILLIN

By P. L. DESHMUKH, M.D. (Bom.),
D.T.M. & H. (Lond.), F.C.P.S.
Sassoon Hospitals, Poona

It must be admitted that even with quinine and the synthetic antimalarial drugs like atabrine, mepacrine, etc. (henceforth called 'specific antimalarials' for the sake of brevity) the treatment of malaria is still very unsatisfactory. The recognized failure of the specific antimalarials singly or in combination to control the relapses materially is a matter of great concern. A great variation is observed in the interval that may elapse before the occurrence of a relapse. The period is known to extend from a few days to several years, but for all practical purposes it is taken as four months. Sometimes in the absence of a relapse the infectivity of the blood is demonstrated after many years by the appearance of malaria in a person transfused with the blood of a once malarial patient (*Jewish Med. Assoc.*, 1945). Professor Adler of Palestine is of opinion that, 'Plasmodium once acquired cannot be got rid of, a fact on which amount of quinine administered has no bearing'.

It is, sometimes, difficult to check acute exacerbations of malaria with the specific antimalarials. This is attributed to the difference in the strains of the plasmodium, some being more resistant to the specific antimalarials. This resistance may be natural or acquired. Some strains may be perhaps more virulent than others. The difficulty becomes greater when pregnancy complicates malaria.

The toxicity of the specific antimalarials when used in full doses over long periods also presents a problem in the treatment which cannot be ignored. The magnitude of the problem can be assessed from the numerous clinical reports of toxic effects of antimalarial drugs in the medical journals.

The general dissatisfaction with the specific antimalarials has served to emphasize the importance of developing new methods of treatment in malaria. Below we shall discuss some of them briefly.

Treatment of malaria with arsenicals, singly or in combination with the specific antimalarials, is believed by many as a definite advance in the treatment (*Stewart*, 1945; *Dao*, 1945). The writer was also, in the earlier part, greatly impressed by the treatment when he found on several occasions that it was able to check the acute attacks quickly when the specific antimalarials alone failed to do so or did not come

up to the expectation. But it soon became clear that they did not control relapse, and also that they carry with them a danger of toxicity. Arsenic is notorious for causing damage to liver, kidneys and brain. When pregnancy complicates malaria, the use of quinine and arsenic may be particularly risky and one is on the horns of a dilemma as regards the satisfactory treatment in such circumstances.

The writer's experience of arsenicals in malaria has been borne out by other workers and their findings in large-scale experiments given below will help to dislodge from the minds of the clinicians any lingering faith in arsenic as an ideal antimalarial drug.

Professor Blacklock (1944) has pointed out after long studies at the Liverpool school that though the immediate effects of arsenic in relapsing malaria were striking, the ultimate results were disappointing in that practically all cases relapsed even after full arsenical treatment. Thus, arsenicals though immediately effective against vivax parasites do not eliminate the liability to relapse. It is also important to recognize that the effect of intravenous arsenic is entirely confined to vivax infection; so that, its usefulness in treatment is limited. 'Arsenicals may have a use in special cases but would appear to find little place in routine treatment'.

Kay (1945) reports 67 cases treated with atabrine and mapharsen combination. There was a relapse of 71.6 per cent cases and the mean time of relapse interval was shorter than with atabrine alone. Thus, mapharsen is of no practical value as an adjuvant to atabrine in the treatment of relapsing tertian malaria.

The remarkable activity of the sulphonamide compounds in bacterial infection led to their being tried in malaria. After experience with prontosil (*Editorial*, 1939), Niven concludes that 'although prontosil has lethal action on the malarial parasite it has no place in practical treatment of malaria, owing to its low efficiency, possible toxicity and relatively high cost'.

The suggestion that sulphonamide derivatives might be able to prevent relapse in malaria where the infection is already clinically suppressed by a previous course of one or more of the specific antimalarials, encouraged Coggeshall and others (1945) to try sulphadiazine, in the army. They treated 33 patients of vivax infection with sulphadiazine for two months immediately after the clinical symptoms were controlled by the specific antimalarials. Follow-up three months later showed 16 or 48.5 per cent had relapsed, thus demonstrating that sulphadiazine has no value in preventing relapses in vivax infection.

Coxon and Hayes (1946) treated 20 cases of malaria with sulphadiazine with relapses in one month.

Recently, Gross (1947) has suggested the use of male hormones for the prevention of relapses in malaria. The rationale on which he bases the treatment appears far from convincing. I

have no experience of his treatment but I seriously doubt whether the treatment will be advisable in female patients in view of the possible hormonal effects on the secondary sexual characters.

Recent world war has given a great impetus to the research in the therapeutics of malaria. Difficulty to cure the Pacific vivax infection was very disconcerting, and new chemicals came on the field for clinical trial. Following are some of them: *Chloroquine*. It was found to be less toxic and more effective than quinacrine against the plasmodium. It is useful in curing the falciparum infection, but in the case of vivax, it only tends to prolong the interval between relapses. Thus, though it is superior to quinine and quinacrine as an antimalarial drug in acute attack, it fails to control the relapses due to vivax. *Pamaquine*. This drug is believed to be useful in curing vivax infection. But the therapeutic dose is so close to the toxic dose that it is dangerous to use it in routine practice. *Pentaquine*. This is closely related to pamaquine chemically. It is as effective as and less toxic than the latter and holds a good promise to lead to even a still less toxic drug which may be useful for routine treatment. *Paludrine*. It is too early to express an opinion on the efficacy of this drug but it is believed that it will not control vivax relapses materially.

It is generally believed that the more thorough the treatment of the acute attack by the specific antimalarials, the less likely is the occurrence of the relapses. This assumption is not justified by the experience of Hughes and Bomford (1944) in West Africa. They treated a series of 1,200 cases in the army 'thoroughly' with the specific antimalarials and after a follow-up they report that 'the return cases were no less numerous than anyone else's even after a "thorough" treatment'.

Another prevalent belief is that relapses can be avoided by the constant use of atabrine or quinine. Such a use of the specific antimalarials, after all chances of re-infection are excluded, will only insure freedom from clinical symptoms as long as taken. They do not cure. If relapses cannot be controlled, the rational therapy should consist of treatment of relapses as they occur rather than continuous suppression by medication. Thus, there is yet no drug or method of treatment that can be relied on to terminate the malarial infection.

With a view to finding a treatment that will check the acute attack and also control the relapses the writer decided to try the effect of quinine in conjunction with the antibiotic penicillin. Penicillin is shown to have no action on inoculation (Hindle *et al.*, 1945) malaria and plasmodium is believed to be insensitive to penicillin, still the choice of penicillin for therapeutic trial was guided by the fact that its potentialities are not yet completely known. It was thought that though it may have no effect on the peripheral parasites, it may show

some action on the mysterious cycle of the parasite in the internal organs. In all 6 cases were treated with success on this line of treatment. The following is the report of two typical cases so treated:

Case 1

Mrs. S. J., aged 35 years, four months' pregnant, came under observation for fever with rigors of 15 days' duration. The fever rose every day to 103 to 104°F. with rigors and came down with profuse perspiration. There was a history of similar attacks one year back. Before coming under observation, she was reported to have been treated during this attack by two injections of quinine and yellow tablets probably mepacrine. A blood film taken during the rigor showed 2 to 4 parasites in each field in various stages of development, denoting clearly that the treatment given was not able to suppress the infection and check the acute bouts. Spleen was enlarged two fingers. She was very anæmic so much so that a few steps made her breathless. The rapid development of anæmia can be judged from the fact that 15 days back she was well and working. An injection of quinine bihydrochlor gr. vi was given in one buttock and two lac units of penicillin in 6 c.c. of normal saline were given on the other buttock, intramuscularly, in the morning. The temperature rose only to 100°F. that evening and came down to normal in two hours. Next morning only the dose of penicillin was repeated. There was no rise of temperature that evening. Third morning both quinine and penicillin were repeated as on the first day. For the next 5 days mepacrine tablets were given twice a day. None of the drugs were repeated thereafter. Further treatment consisted only of iron mixture and liver extract injections to combat anæmia. Blood films examined at fortnightly intervals did not show any parasites. There is no recurrence of fever to the present day, i.e. four months after.

Case 2

Mr. S. V. K., aged 24 years, came for repeated attacks of fever with rigors for the last six months off and on. The fever was checked every time by the specific antimalarial drugs. When he came under observation he had enlarged spleen, anæmia and his blood film showed benign tertian infection. He was treated with injections of quinine and penicillin and mepacrine tablets as in the previous case. For the last three months he has no recurrence of fever and the blood film does not show parasites.

Four other cases were treated similarly but have been followed only for six to eight weeks without a relapse.

Discussion

It is very premature to draw conclusions of a definite nature from the meagre clinical

material presented here. However, it will be found to be fairly informative regarding the prospects of this combination treatment in the control of malarial relapses. It will, at least, be considered as deserving a trial in a larger series of cases. In case 1, the outstanding feature was the early control of the acute attack which was not checked by the previous treatment with injection of quinine and probably mepacrine tablets. It clearly appeared that penicillin had a synergic effect on quinine in terminating the malarial cycle once for all, and preventing relapse in the next four months at least. It also became possible to suppress the infection with only a small dose (gr. xii) of quinine with the help of penicillin as it was feared that quinine in larger doses would exert an abortive effect.

Case 2 clearly illustrates the influence of the combination treatment on the control of relapses in particular.

Mechanism of relapse and the probable action of penicillin

The problem of control of relapse will be greatly elucidated if we are able to formulate our conception regarding its mechanism. Experiments in avian malaria have tended to modify the theory of malarial cycle. According to the modern concept (National Med. Congress, 1946) the cycle of the parasite in the human host is far more complicated than the simple invasion of the red blood cells. Fairley has shown that the sporozoites disappear from the blood stream in 30 minutes after inoculation by the mosquito to reappear in the peripheral blood on the ninth day and regularly thereafter. Thus, there appears to be a pre-erythrocytic stage in which the parasites invade the endothelial or mesenchymal tissue cells where, it is presumed, they undergo a distinct cycle of development before they are discharged in the blood stream. In blood they begin the so-called erythrocytic cycle. The persistence of the infection in the mesenchymal cells essentially contributes to the recurrence of malaria. Thus, the mechanism of the relapse can be explained by the periodic discharge of parasites in the peripheral blood from the fixed tissue cells. The mesenchymal tissue of healthy persons is strong enough to have plasmodia constantly captive. But as soon as the resistance of the individual lowers, the hold of the mesenchymal tissue on the plasmodia becomes weaker with their consequent escape in the peripheral blood to bring on a recurrence of malaria. This theory explains a number of problems that are encountered in the study of malaria.

It explains the variation that is observed in the relapse rates of the tertian and malignant forms. *Falciparum* malaria, if well treated in the acute stage, does not tend to relapse while *vivax* infection is notorious for its liability to relapse (Editorial, 1946). A short term of development in fixed tissues with complete

delivery of parasites in the blood would lead to a short-term infection, as in *falciparum*. Conversely, a prolonged period of development in fixed tissues with partial expulsion of parasites in the blood stream, would lead to a relapsing infection, as in *vivax*.

The new concept also explains why even a 'thorough' treatment of the acute attack is not able to prevent relapses. The specific anti-malarials which are commonly used act only or mainly on the erythrocytic stage of the parasite. The mesenchymal cycle is unaffected though the peripheral blood may be cleared of parasites. Thus the usual antimalarial treatment, however 'thorough', is not able to de-infect the fixed tissue cells and thus to prevent the invasion of the erythrocytes in the peripheral blood. Some drugs like pamaquine, paludrine, etc., are believed to act also on the pre-erythrocytic stage of the parasite and hence their relative efficacy in the control of relapse.

The control of relapse when penicillin is used in conjunction with the specific antimalarials can be explained by assuming that penicillin has an anti-parasitic action on the pre-erythrocytic stage of the parasite either directly or indirectly by affecting the metabolism of the mesenchymal cell which lodges the parasite ('host-cell' or 'lodger-cell').

The theory will explain the appearance of clinical malaria soon after the suppressive therapy is suspended, and the late primary manifestations after prolonged prophylactic suppressive measures.

Unfortunately, conclusive evidence of the pre-erythrocytic stage in man is still to be found though there is much to support the postulation of its existence. If our claims for usefulness of the combination treatment for control of relapses are supported by our further work and that of other workers in the field, the problem of relapsing malaria will be solved once for all with rational therapy.

Conclusions

From the scanty clinical material available it is presumed that penicillin has a synergic action on quinine in the control of acute attacks of malaria. Penicillin is also believed to have a selective action on the assumed pre-erythrocytic stage of the malarial parasite. The use of penicillin in conjunction with quinine and mepacrine is believed to be useful in controlling the acute attacks quickly and the relapses in the future. The treatment is based on the rationale that the usual specific anti-malarials control the erythrocytic stage and penicillin controls the pre-erythrocytic stage of the malarial parasite.

Summary

Attempts and their futility to discover a treatment to control relapses in malaria so far, are mentioned from literature. Taking advantage of the new concept of malaria cycle in man, a

combination treatment of malaria with quinine, mepacrine and penicillin is suggested which may be adequate to control the acute as well as the relapsing course of malaria. A report of two from the six cases treated on this line is given in full.

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CLINICAL FEATURES OF MURINE TYPHUS

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BETWEEN the middle of October 1946 to the middle of January 1947, 11 cases of typhus fever were admitted in C. M. H., Secunderabad. Seven of these cases were diagnosed as murine typhus.

The cases occurred in a camp, about 80 miles from the town; those of murine typhus, came from sections B, C and D of the camp. These

Clinically the cases will be described here in 2 groups.

Group A.—Four cases of proved murine typhus with positive Weil-Felix reaction and complement-fixation test.

Group B.—Three cases with distinctive clinical features of murine typhus, including rash and positive Weil-Felix reaction in one case.

Group A

The onset was fairly sudden but not severe; it was characterized by rigor (2), headache (2), cough and chest signs (3), pains and aches in the body (2).

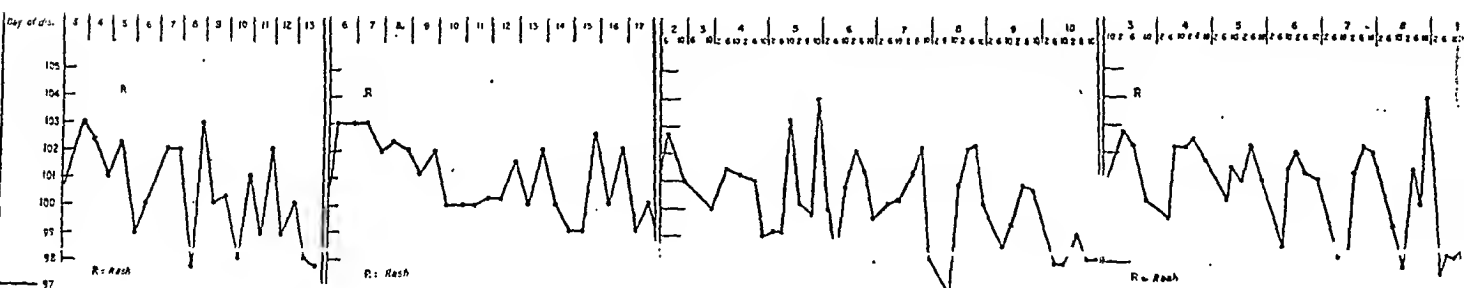
The pain in the chest and moderate cough developed early in the course of the disease.

The fever was of remittent type, with the evening temperature 2 to 3°F. higher than the morning one. The average duration of pyrexia was 11.25 days. It ended by lysis. Tongue was usually coated and dry (see temperature charts 1 to 4).

The pulse rate showed relative bradycardia in proportion to the temperature and the respiratory rate varied in direct proportion to the temperature.

The rash was not a constant feature. It appeared in two cases. In case (1), it was noticed on the 7th day of fever, over the extremities, spreading later to the trunk, soles and palms. Face was exempt. In the early stages, the rash was of a macular type; showed transient fading on pressure. In the later stages, it became petechial. The rash disappeared 6 days after subsidence of pyrexia and left a staining behind. In case (3), faint macular rash appeared on the chest on the 3rd day; spread to the trunk and faded on the 6th day.

There was no adenitis in any of the cases, nor was the spleen or the liver palpable.



Temperature charts of four typical cases of murine typhus.

sections were surrounded by agricultural land and rocky ground with scattered bushes. There were two villages very near the camp, one between B and C, and the other between C and D. It is possible that the infection was acquired in the villages. The epidemiologic aspects are under investigation by the Field Typhus Research Team.

Chest signs.—Physical findings varied from bronchitis to that of pneumonitis with impairment of percussion note over the bases, especially over the left base. Radiological findings were indefinite and varied: case (2), faint mottling of lung fields, case (3), increased density over the bases and case (4), increased density over left mid and lower zones.

Weil-Felix reaction OX19—1/640 to $\frac{1}{10,240}$ (3 cases). OX2—1/2560 (1 case).

Complement-fixation test against murine typhus was positive in all the four cases in titres 1/20 to 1/40.

Leucocyte count varied from 6,000 to 12,000 per c.mm. with more than 70 per cent polymorphs.

Blood culture and widal tests were negative.

Complications.—Two cases had acute mental symptoms, e.g. delirium, euphoria; behaviour abnormality. One case had epididymitis.

Average stay in hospital—40 days, longest being 70 days and shortest 23 days.

No fatality.

Case notes

(1) Gnr. C. L., B.O.R., age 32; onset of disease on 2nd November, 1946. Admitted on 5th November, 1946, presenting symptoms—fever, rigor, headache and cough. Duration of fever 16 days. Rash appeared on the 7th day of illness; macular at first, later petechial; distributed over the whole body, including palms and soles; face exempt. Rash lasted for 15 days and left a staining.

Weil-Felix reaction—	18-11-46	24-11-46	13-12-46
OXK	0	0	0
OX19	1/640	1/320	1/40
OX2	1/2560	1/1280	1/640

Complement-fixation test 1/40 (24-11-46)
(against murine typhus).

(2) Swr. M. N., I.O.R., age 23; onset of disease on 2nd January, 1947. Admitted on 4th January, 1947, presenting symptoms—fever, cough and pain in the chest. Duration of fever 10 days. No rash. Chest—diminished breath sounds in both bases. X-ray chest—faint mottling, both lung fields.

Weil-Felix reaction—	4-1-47	15-1-47
OXK	1/40	1/40
OX19	1/640	1/640
OX2	1/320	1/640

Complement-fixation test 1/40 (15-1-47)
(against murine typhus).

(3) L/Nk. K. H., I.O.R., age 25; onset of disease on 11th January, 1947. Admitted on 13th January, 1947, presenting symptoms—fever with rigor and cough; duration of fever 8 days. Rash appeared on the 3rd day of illness; macular type; distributed over the trunk only; lasted for 3 days and left no staining. Other features in this case were nerve deafness; marked bradycardia with dicrotic pulse; drowsiness

followed by acute mental symptoms; during convalescence developed acute epididymitis.

Weil-Felix reaction—	25-1-47	30-1-47	13-1-47	21-1-47
OXK	0	0	0	1/20
OX19	1/2560	1/1280	1/320	1/640
OX2	1/320	1/160	0	0

Complement-fixation test 1/20 (30-1-47)
(against murine typhus).

(4) Captain P., age 26; onset of disease on 22nd January, 1947. Admitted on 23rd January, 1947, presenting symptoms—fever with pain all over the body, cough and headache. Duration of fever 11 days. No rash. Chest x-ray 'increased density mid and lower zones of left lungs'.

Weil-Felix reaction—	23-1-47	6-2-47
OXK	0	0
OX19	1/640	1/10240
OX2	1/160	1/40

Complement-fixation test 1/40 (6-2-47)
(against murine typhus).

Group B

Three cases had clinical symptoms more or less similar to group A cases, e.g. remittent pyrexia—average duration 15 days; dry coated tongue, bradycardia, rash over the trunk; no glandular or splenic enlargement; acute mental symptoms (2 cases); agglutination against OX2 in high titre (1 case). Complement-fixation test was not done in these cases. They probably were also cases of murine typhus.

Case notes

(1) Gnr. K. J., I.O.R., age 23; onset of disease on 25th October, 1946; date of admission 29th October, 1946; duration of fever 12 days presenting symptoms—fever with headache, pain in the body and cough. Rash appeared on the 5th day; maculo-papular in type and distributed over the trunk; lasted for 5 days and left no staining. This patient had symptoms of acute toxic psychosis.

Weil-Felix reaction—	2-11-46	6-11-46
OXK	0	0
OX19	1/20	1/80
OX2	1/80	1/2560

(2) H/C. M., I.O.R., age 33; onset of disease on 8th November, 1946; admitted on 13th November, 1946; presenting symptoms were fever with rigor and joint pains. Fever lasted for 17 days. Macular rash appeared on the 7th day; was distributed over the whole body, palms and soles being exempt. The rash faded after 7 days, leaving a staining behind. Symptoms of

acute mental confusion appeared during the course of the disease.

Weil-Felix reaction—	14-11-46	22-11-46	27-11-46
OXK	1/20	1/20	0
OX19	0	0	0
OX2	0	1/20	1/80

(3) Dvr. C., I.O.R., age 22; onset of disease on 1st December, 1946; admitted on 5th December, 1946; presenting symptoms were fever with pain all over the body; duration of fever 16 days. Rash appeared on the 11th day at first macular in type, later became papular. It was limited to the trunk only and faded after 12 days, leaving a faint stain behind.

Weil-Felix reaction—	12-12-46	17-12-46	24-12-46
OXK	0	0	0
OX19	1/40	1/80	1/80
OX2	0	1/20	1/20

Conclusion.—Seven cases of fever diagnosed as murine typhus are described. Cases in groups A and B had similar clinical features, with a remittent pyrexia, furred tongue, bradycardia, and presence of rash of varying severity in some cases. In group A cases, diagnosis of murine typhus was established by Weil-Felix reaction against either OX19 or OX2 in high titre and complement-fixation test against murine typhus. Group B cases had rash (3) and positive Weil-Felix reaction (1).

I am indebted to Major S. L. Kalra, I.A.M.C., of Field Typhus Research Team for many valuable suggestions.

SCRUB TYPHUS: VARIATIONS IN CLINICAL SYMPTOMS AND STRAINS

By S. LAL KALRA

THE object of this short paper is to point out certain symptoms peculiar to certain places and present laboratory evidence of the variation of the rickettsial strains which one considers to be the cause of difference in the severity and symptoms of the disease.

The entry of the forces in large numbers in the eastern zone of war not only brought to light the presence of scrub typhus in unrecorded areas, but also interesting information about its clinical variations in different countries and in different parts of the same country. The local population in endemic areas generally acquires immunity by mild attacks during childhood and does not provide evidence of the disease. It is also well known that the disease in children is mild and has low mortality rate and reverse is the case in older people. Lewthwaite and Savoir (1940) in Malaya have recorded two deaths out of twenty-five in patients under eighteen and 4 out of 20 in those over forty

years of age. The experience in this war was that the fatalities were higher in the age group thirty-five years and over as compared to the age group below it. The information obtained during this war is important, for it is based on the incidence of the disease in a non-immune population more or less of the same age group in different areas.

Clinical

Considering mortality rate as one of the criterions of the severity of a disease, different areas fall into two categories, those with a mortality rate of 0 to 3 per cent and others of 8 to 12 per cent (table I). There are hardly any areas which fall outside these limits. Japan where the mortality rate is said to be over 20 per cent or over is excluded as only pre-war records were available.

TABLE I

Force	Place	Number of cases	Deaths	Mortality rate, per cent
British ..	Addu Atoll and Diego Garcia.	100	1	1.0
Indians ..	Addu Atoll	1,056	24	2.4
" ..	Diego Garcia	85	0	0.0
" ..	Ceylon	20	0	0.0
British ..	Ceylon	64	0	0.0
E. Africans	Ceylon	713	13	1.8
Indians ..	Meiktila-Burma	40	0	0.0
" ..	Mandalay-Burma	130	13	10.0
" ..	Moreh-Burma	35	4	11.4

Mandalay.—The mortality rate in this area was 10 per cent. Majority of the cases were very toxæmic. The particular symptom was tympanites which occurred in 30 cases out of 80. The condition was distressing to the patient and difficult to relieve.

Meiktila.—The disease was generally mild, no case was toxæmic and there were no fatalities. This area is at a distance of 110 miles only from Mandalay.

Kalewa.—The infections here also ran a mild course and there were no deaths. Inflammations of the parotid glands occurred in two cases early during the course of the fever.

Moreh (Imphal-Burma border).—The cases in this area were drawn from both sides of the border. The mortality rate was 9 per cent. Some cases were so mild that they sought hospitalization 7 to 10 days after they had been febrile. In these cases there was hardly any toxæmia, there were no serious symptoms or complications, but the febrile period was prolonged to four weeks which was longer than in serious cases. In Ceylon (*vide infra*) the febrile period was increased by lung complications, but here there were no complications to account for it.

In severe cases there were marked daily fluctuations in the temperature in the first ten days, delirium was common and in fatal cases the death occurred in the second week. On post-mortem examination in two cases there was hæmorrhage in the sheath of the rectus muscle spreading downwards into the recto-peritoneal tissue, and in the other two cases free fluid was present in the pericardial sac, besides the usual pathological changes present in a case of scrub typhus.

Ceylon.—The early symptoms in a vast majority of cases were marked enlargement and tenderness of the cervical lymph glands which rendered all neck movements painful and produced false rigidity. Movements of the eye balls were also painful, there was suffusion of the eyes and drowsy look. These symptoms produced such a typical rigid expression that spot-diagnosis was unmistakable. This combination of early symptoms with such a regularity was not seen in any other area. The disease otherwise was rather mild and complications were few. There were only odd cases of delirium, tracheitis, broncho-pneumonia, epistaxis and renal failure. The duration of fever in most of the cases was less than three weeks and prolongation of this period was generally due to lung complications. There were no fatal cases in British and Indian troops and the mortality rate in East Africans was 1.8 per cent.

Addu Atoll (Maldiv Islands).—The incidence of the disease was very high reaching 49.5 per thousand per month in August 1942, but the symptoms were typical of a mild attack. Pneumonitis was the only common symptom in every case. The mortality rate was 2.4 per cent in Indian troops and 1 per cent in British troops. Some of the cases died of sudden heart failure during convalescence. One case while convalescing in his unit lines developed acute meningococcal septicæmia and died within twenty-four hours.

Experimental evidence

Cross immunity and one way immunity experiments were carried out on rabbit's eye with some of the *R. orientalis* strains isolated from different areas. The results showed that while strains from different sources from the same area gave complete cross protection, strains from different areas failed to do so.

R2 strain from Paungde in Burma gave no cross immunity against E strain from a patient in Kalewa and D2 strain from mites from Palel (Imphal), while E and D2 strains gave complete cross protection against each other.

Another rabbit immunized with R2 strain was re-inoculated in the other eye, six months later, with a strain from Bhim Tal (Kumaon hills) and developed a non-immune reaction.

R2 strain always produced a severe reaction in the eye of the rabbit as contrast to a strain (Bi) from Tamu, which always produced a mild reaction. The disease in Tamu from where the strain was recovered was also generally mild.

A rhesus monkey that had been twice inoculated with Imphal strains reacted like a non-immune animal to R2 strain developing marked fever and lymphopenia.

When a Kumaon mite strain and a Kumaon rat strain were tested against Ceylon strain the mite strain produced a reaction but the rat strain did not.

Conclusions

From the above evidence one can conclude that even in different parts of the same country the disease may be mild with low mortality rate of below 3 per cent, or severe with high mortality rate of 8 to 10 per cent.

There are variations in particular symptoms from place to place although the symptoms in any one district are usually consistent and one considers that this is due to variations in the virulence and other qualities of different strains.

TABLE II
Intra-ocular tests on rabbits

Immunizing strain	Incubation period, days	Duration of reaction, days	Challenge strain	Incubation period, days	Duration of reaction, days
E-Kalewa ..	7	20	R2-Burma	10	18
R2-Burma ..	10	22	E	8	20
D2-Imphal ..	14	26	R2	6	17
R2 ..	10	22	D2	19	26
E ..	9	15	D2	..	No reaction
D2 ..	7	24	E	..	No reaction
Ceylon ..	15	6	M-Kumaon	6	18
..	10	22	R-Kumaon	..	No reaction
B2-Imphal ..	11	23	* M-Kumaon	..	No reaction
R2-Burma ..	9	24	* R-Kumaon	19	No reaction

*The challenge dose was given six months after the first inoculation.

Diego Garcia (Chagas Archipelago).—There were 85 cases in Indian troops with no complications and no fatality.

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SULPHADIAZINE IN THE TREATMENT OF CHOLERA

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CHU AND HUANG (1946) used sulphadiazine in 10 cholera patients with 10 other patients as controls. The average duration of diarrhoea of the sulphadiazine-treated patients (4.6 days) was shorter than that of the controls (7.1 days) and the total amount of saline required was less in the sulphadiazine-treated cases than in the controls. Chu, Huang, Chang and Kao (1946) report the treatment of 25 cases of cholera with sulphadiazine and compare the result with that of 29 cases not treated with sulphadiazine and claim efficiency for sulphadiazine on clinical data.

The results of treating a larger series of cholera patients with sulphadiazine* as compared with the results of a parallel series not treated with sulphadiazine are presented in table I.

All the patients were suffering clinically from cholera and were treated as in-patients in a cholera hospital. The selection of cases for treatment was made on alternate admission basis. In many, the diagnosis was confirmed by the isolation of agglutinable vibrios, but it was not possible to make full bacteriological examination in every case. All the patients received the usual saline supportive treatment. The sulphadiazine series received powdered sulphadiazine 1 gramme, 4-hourly during the acute stage of the disease and three times a day for two days afterwards unless the patient left the hospital earlier.

TABLE I

Results of treatment of cholera cases with sulphadiazine as compared with a parallel series not receiving sulphadiazine. The general supportive treatment was the same in both series

	Treated with sulphadiazine	Not treated with sulphadiazine
Number in series ..	425	423
Number recovered	390	383
Number died ..	35 or 8.2%	40 or 9.5%

Further trials were undertaken using two parallel series, one receiving sulphaguanidine and the other sulphadiazine. The sulphaguanidine-treated series received powdered

* Sulphadiazine used for these trials was kindly donated by Messrs. May and Baker, Ltd. and Lederle Laboratories.

sulphaguanidine 3 grammes, 4-hourly during the acute stage of the disease and three times a day for two days afterwards unless the patient left the hospital earlier.

TABLE II

Results of treatment of cholera cases with sulphadiazine as compared with a parallel series treated with sulphaguanidine. The general supportive treatment was the same in both series

	Treated with sulphadiazine	Treated with sulphaguanidine
Number in series ..	451	463
Number recovered	415	443
Number died ..	36 or 7.9%	20 or 4.3%
	$\chi^2 = 5.4$; $P = 0.02$	

From the above results it will be seen that sulphadiazine has no appreciable effect on the mortality of cholera. A careful watch was maintained for the development of any toxic symptoms after the administration of sulphadiazine, but no ill-effects were observed. Sulphaguanidine on the other hand is of value in the treatment of cholera.

Summary

A series of 425 cholera patients were treated with sulphadiazine in addition to the usual saline supportive treatment. The death rate in this series was 8.2 per cent. A parallel series of 423 control cases not treated with sulphadiazine gave a death rate of 9.5 per cent.

Another series of 451 cases treated with sulphadiazine was compared with a parallel series of 463 cases treated with sulphaguanidine. The mortality in the sulphadiazine series was 7.9 per cent whereas in the sulphaguanidine series it was 4.3 per cent.

Sulphadiazine in the dosage used had no beneficial effect on cholera.

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SULPHAGUANIDINE IN THE TREATMENT OF CHOLERA

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SULPHAGUANIDINE has been reported on favourably in the treatment of cholera. The

published reports of the use of this drug in cholera are summarized in the January numbers of the Tropical Diseases Bulletin of 1943, 1945, 1946 and 1947. The number of cholera cases in which sulphaguanidine was tried and the results obtained are summarized in table I.

Although records were maintained of the age, sex, history and the clinical condition of each case the only criterion of the result of treatment used in this paper is the recovery or death of the patient. Whether the patient was admitted dying or died within a few hours or whether

TABLE I

The results of the treatment of cholera with sulphaguanidine as reported by different workers

Author	Year	Place of investigation	TREATED WITH SULPHAGUANIDINE		CONTROL SERIES	
			Number	Deaths	Number	Deaths
Chopra, R. N., deMonte, A. J. H., Gupta, S. K., and Chatterji, B. C.	1941	Calcutta (India)	281	7 or 2.2%	94	6 or 6.4%
Carruthers, L. B.	1942	Miraj (India)	50	7 or 14.0%	88	15 or 17.0%
Huang, J.	1944	Kweilin (China)	22	1 or 4.5%	Average cholera death rate in other hospitals 26%.	
Misra, K. N.	1944	Puri (India)	16	1 or 6.3%	70	22 or 31.4%
Lahiri, S. C.	1945	Calcutta (India)	114	17 or 14.9%	176	52 or 29.5%
Gupta, S. K., Chatterji, B. C., Paul, B. M., and Ghose, R. N.	1945	Calcutta (India)	263	3 or 1.1%	262	13 or 4.9%
Chu, L. W., Huang, C. H., Chang, C. T., and Kao, H. C.	1946	Chungking (China)	25	1 or 4.0%	29	1 or 3.4%
The hospital series in this paper	1947	Calcutta (India)	1,118	41 or 3.7%	1,170	88 or 7.5%
The village series in this paper	1947	Bengal (India)	60	11 or 18.3%	69	24 or 40.7%

There is reduction in the mortality in the sulphaguanidine-treated series and all workers except Carruthers (1942) claim that sulphaguanidine is of value in the treatment of cholera. The workers, who were able to treat only small series of cases, have based their claims for the efficiency of sulphaguanidine on clinical observations, such as the reduction of the duration of diarrhoea and vomiting, reduction in the amount of intravenous saline required and that anuria and other complications were less frequent in the sulphaguanidine series than in the control series of cases.

The present report is based on trial of sulphaguanidine* in a large series of cholera patients treated in a hospital in Calcutta and in a small series treated in villages under village home conditions. The selection of cases for treatment with sulphaguanidine was on alternate admission basis. All patients were suffering clinically from cholera presenting classical signs and symptoms. In many, the diagnosis was confirmed by the isolation of agglutinable vibrios but it was not possible to make full bacteriological examination in each case. In the hospital treated cases the usual saline supportive treatment was given as indicated. The sulphaguanidine-treated series received powdered sulphaguanidine 3 grammes, 4-hourly during the acute stage of the disease and three times a day for two days afterwards unless the patient left the hospital earlier.

death occurred from other causes than cholera has not been taken into consideration. All cases are taken as cholera and all deaths as due to cholera. In this way we have eliminated all factors which may introduce any bias in selection. The results of this trial are presented in table II.

TABLE II

Results of treatment of cholera cases in hospital with sulphaguanidine as compared with a parallel series not receiving sulphaguanidine. The general supportive treatment was the same in both series

	Treated with sulphaguanidine	Not treated with sulphaguanidine
Number in series	1,118	1,170
Number recovered	1,077	1,082
Number died ..	41 or 3.7%	88 or 7.5%
$\chi^2 = 15; P = 0.001$		

The inclusion of 52 more cases in the series not treated with sulphaguanidine was due to clerical error.

Cholera patients treated with sulphaguanidine under village conditions.—Hospital facilities were not available and effective supportive saline or other treatment was not possible. The patients were nursed by their relatives in their homes. The dosage of sulphaguanidine was the same as given to the patients treated in hospital. Those not receiving sulphaguanidine were given an

* Part of the sulphaguanidine used in this trial was kindly donated by Messrs. May and Baker, Ltd.

inert powder, calcium carbonate as a placebo, in the same dosage as the sulphaguanidine-treated cases. The results are given in table III.

TABLE III

Results of treatment of cholera cases with sulphaguanidine under village conditions as compared with those not receiving sulphaguanidine. No effective supportive treatment was possible

	Treated with sulphaguanidine	Not treated with sulphaguanidine
Number treated	60	59
Number recovered	49	35
Number died ..	11 or 18.3%	24 or 40.7%
	$\chi^2 = 7.16$; $P = \text{less than } 0.01$	

The results recorded above show that sulphaguanidine is of definite value in the treatment of cholera. Careful watch was kept for any toxic symptoms developing after sulphaguanidine therapy but with the dosage employed no toxic symptoms ascribable to sulphaguanidine were noted.

Summary

A series of 1,118 hospitalized cholera patients were treated with sulphaguanidine with a death rate of 3.7 per cent. A parallel series of 1,170 control cases were treated in exactly the same way but not given sulphaguanidine and the death rate was 7.5 per cent. A series of 60 cholera patients were treated with sulphaguanidine in village homes. No supportive treatment was possible. The death rate in this series was 18.3 per cent, whereas in a parallel control series of 59 cases, the death rate was 40.7 per cent.

Sulphaguanidine is thus of considerable value in the treatment of cholera.

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A COMPARISON OF THE SUBCUTANEOUS AND INTRADERMAL METHODS OF IMMUNIZATION WITH T.A.B. VACCINE—AN EXPERIMENTAL STUDY

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ACTIVE immunization against typhoid and paratyphoid group of fevers is done by the time-honoured subcutaneous method of inoculation with T.A.B. vaccine. Tuft (1931) advocated the intracutaneous method of immunization by 4 doses of triple typhoid vaccine in doses of 0.05, 0.1, 0.15 and 0.2 c.c. with an interval of 5 to 7 days between one injection and the next. His conclusions were based on the agglutinin titrations of the individuals. Later he (Tuft, 1940) reported the results of mouse protection tests with pooled sera from 9 individuals who were inoculated intracutaneously with 3 doses of typhoid vaccine (0.1, 0.15 and 0.2 c.c.) at weekly intervals. A number of other workers have published papers on the subject, viz, Valentine *et al.* (1935), Perry (1937), Wyandt *et al.* (1938) and Van Gelder and Fisher (1941).

The intradermal or intracutaneous method of inoculation, though not preferred for the initial immunization, is recommended for 're-vaccination' (Luippold, 1944). Fennel (1942) however mentions the widespread practice of intracutaneous inoculation of the civilian population of Hawaii by the local health authorities.

Among the advantages claimed for the intracutaneous method is the fact that only about one-fifth of the amount of vaccine is required, i.e. whereas by the subcutaneous method (0.5 c.c. and 1 c.c.), 1.5 c.c. of vaccine is necessary for an adult, the same amount of vaccine is enough for five adults by the intracutaneous method in which 0.1 c.c. is given as the first dose and 0.2 c.c. as the second dose after a week. If this is accepted, it is obviously very economical. Another advantage claimed for the intradermal method is that reactions, either local or general, are very much less, owing to the smaller amount of antigen used. In fact, Perry (1937) states that he noticed no reactions with the intracutaneous method, whereas by the subcutaneous method there were a few reactions.

An experimental investigation was undertaken in the King Institute to evaluate the intracutaneous method of T.A.B. inoculation. Fifty-four rabbits (mostly males, with an average weight of 1,250 grammes), five human volunteers and ninety-two white mice, each weighing 16 to 18 grammes and about 4 weeks old, were used in the investigation.

Owing to lack of sufficient quantities of a reliable brand of mucin, and suitable mice, the mouse protection tests were very few, but the experiments are being continued and a further report will be made in a later paper.

Immunization

One batch of twenty-seven rabbits and three human volunteers was immunized by the subcutaneous method. The rabbits were given 0.2 c.c. and 0.4 c.c. of T.A.B. vaccine with an interval of one week between the injections. The human volunteers were given the usual 0.5 c.c. and 1 c.c. with an interval of one week between the injections.

Another batch of twenty-seven rabbits and two human volunteers was immunized by the

human volunteers was one week. No untoward reactions were noted after the intradermal inoculations either in rabbits or human volunteers.

One week after the second injection, samples of blood from the fifty-two rabbits which survived and the human volunteers were withdrawn, serum separated and used for estimation of 'H' and 'O' agglutinins (Widal test). A part of the serum from each case was stored in the refrigerator for about 2 to 3 weeks and then used for 'protection tests' on mice.

The results of the 'H' and 'O' agglutinin titres in rabbits before immunization and one week after the second immunizing dose are given in table I. The corresponding results in human volunteers are given in table II.

TABLE I
Rabbits

INTRADERMAL METHOD OF IMMUNIZATION					SUBCUTANEOUS METHOD OF IMMUNIZATION				
Rabbit number	Before inoculation		1 week after 2nd injection		Rabbit number	Before inoculation		1 week after 2nd injection	
	'H'	'O'	'H'	'O'		'H'	'O'	'H'	'O'
1	—	—	+200	+200	2	—	—	+200	+200
3	—	—	+200	+200	4	—	—	+200	+200
5	—	—	+200	+400	6	—	—	+50	+200
7	—	—	+100	+200	8	—	—	+50	+200
9	—	—	+50	+200	10	—	—	+100	+200
11	—	—	+100	+400	12	—	—	+100	+200
13	—	—	+25	+25	14	—	—	+50	+50
15	—	—	+50	+50	16	—	—	+50	+50
17	—	—	+50	+100	18	—	—	+50	+50
19	—	—	+50	+25	20	—	—	+25	+100
21	—	—	+200	+100	22	—	—	+200	+200
23	—	—	+200	+200	24	—	—	+200	+200
25	—	—	+100	+200	26	—	—	+400	+200
27	—	—	+200	+400	28	—	—	+200	+400
29	—	—	+400	+400	30	—	—	+200	+400
31	—	—	+50	+200	32	—	—	+100	+200
33	—	—	Animal died		34	—	—	+200	+400
35	—	—	Animal died		36	—	—	+400	+400
37	—	—	+400	+400	38	—	—	+400	+400
39	—	—	+400	+200	40	—	—	+200	+400
41	—	—	+400	+400	42	—	—	+50	+400
43	—	—	+200	+400	44	—	—	+400	+400
45	—	—	+200	+400	46	—	—	+200	+400
47	—	—	+400	+400	48	—	—	+100	+400
49	—	—	+200	+400	50	—	—	+400	+200
51	—	—	+200	+400	52	—	—	+200	+400
53	—	—	+200	+400	54	—	—	+200	+400

intradermal method. The rabbits were given 0.1 c.c. and 0.2 c.c. of T.A.B. vaccine* intradermally into the shaved skin of the abdomen. The human volunteers were given 0.1 and 0.2 c.c. intradermally into the skin of the upper arm. The interval between the first and second injections in the case of the rabbits as well as the

*The T.A.B. vaccine was prepared at the King Institute. It contained 1,000 million *Bact. typhosum* and 500 million each of *Bact. paratyphosum* A and B per c.c.

The results show that none of the rabbits and human volunteers showed any agglutinins 'H' or 'O' in their blood before the inoculations. One week after the second injection (considering 'O' titre as the index of immunity) 20 out of the 25 rabbits which were alive one week after the second injection showed an 'O' agglutinin titre of 200 and above and out of these 12 were titres of 400. In the subcutaneous immunization group, twenty-three out of twenty-seven rabbits showed a titre of 200 and above and out of these 12 were titres of 400.

TABLE II
Human volunteers

Num- ber	INTRADERMAL METHOD OF IMMUNIZATION					Num- ber	SUBCUTANEOUS METHOD OF IMMUNIZATION				
	Name	Before inoculation		1 week after 2nd injection			Name	Before inoculation		1 week after 2nd injection	
		'H'	'O'	'H'	'O'			'H'	'O'	'H'	'O'
1	Bhaskaran	—	—	—	+100	2	Dr. D. B.	—	—	+25	+100
	Nair.					4	D. R.	—	—	+50	+200
3	Subramanian	—	—	+100	+200	5	Ahmed Basha	—	—	—	—

Note : — means negative 1 in 25; + 100 means positive 1 in 100.

Two rabbits in the 'intradermal group' died probably as a result of intercurrent disease. The death was not due to the intradermal inoculation. None of the other rabbits which received the intradermal injections showed evidence of illness or severe reactions.

It is seen from the results that there is no appreciable difference between the 'O' agglutinin titres (or 'H' agglutinin titres) in the two groups.

Mouse protection tests

These tests were done according to the method described by Siler *et al.* (1941).

Technique.—White mice approximately 4 weeks old and 16 to 18 grammes in weight each were used. The minimum lethal dose (M.L.D.) of various strains of typhoid bacilli collected in the King Institute was determined as follows :—

As emulsion, in freshly prepared buffered Ringer's solution, of a 24 hours' smooth culture of *Bact. typhosum* was employed. Various doses of typhoid bacilli, i.e. 1,000, 2,000, 5,000, 10,000, 20,000, and 50,000 organisms were suspended in 0.5 c.c. of 5 per cent mucin and used for injection of mice.

(The solution of mucin was prepared a week earlier according to the method described by Siler *et al.* 1941, and stored in the refrigerator, so that, a uniform suspension was obtained.)

The mucin suspension of living typhoid bacilli was used to eliminate as far as practicable the reactions attributable to direct toxicity that would follow the administration of large numbers of typhoid bacilli.* By using a number of strains, one was selected, which gave the most uniform results.

A dose of 5,000 organisms of this strain ('Arogyaswami') suspended in 0.5 c.c. of 5 per cent mucin was found to be the minimum lethal dose for mice weighing 16 to 18 grammes in the

sense that all the four mice inoculated intraperitoneally with this dose died within 72 hours.

Having selected the strain of *Bact. typhosum* and estimated the M.L.D. of this strain, we proceeded as follows :—

Groups of 4 mice or 3 mice (depending upon the number of mice available) were used for each experiment. The mice were injected intraperitoneally with 0.1 c.c. of the immune serum from the rabbit or human volunteers as the case may be ('subcutaneous group' or 'intradermal group'). Half an hour later, a 'challenging dose' of 100 M.L.D., 1,000 M.L.D. and 10,000 M.L.D. in mucin solution of the standard strain selected was injected intraperitoneally. The immune serum was obtained from the rabbits and human volunteers mentioned in tables I and II and stored for at least 2 weeks in the refrigerator to eliminate the interfering action of complement. The mortality of the mice within 72 hours was noted and the results are appended in table III (*vide infra*).

The number of mouse protection experiments is small owing to limited facilities. More such experiments are necessary to give a definite opinion. The results mentioned however show that the serum from intradermally injected rabbits and human volunteers showed approximately the same protective value as the serum from subcutaneously injected rabbits and human volunteers. Further work is in progress.

Summary

1. Twenty-seven rabbits and three human volunteers were immunized with T.A.B. vaccine by the usual subcutaneous method.

2. Twenty-seven other rabbits and two other human volunteers were immunized by the intradermal method.

3. The 'H' and 'O' agglutinin titres of all the rabbits and human volunteers were negative 1 in 25 before the injections.

4. The 'H' and 'O' titres of the group receiving the vaccine by the intradermal route were approximately the same as the titres of the 'subcutaneous' group.

* Mucin really enhances the virulence of the organism according to Topley and Wilson's 'Principles of Bacteriology and Immunity', 1946.—EDITOR, I.M.G.

TABLE III
Mouse protection tests

IMMUNE SERUM FROM INTRADERMAL INJECTIONS			IMMUNE SERUM FROM SUBCUTANEOUS INJECTIONS		
Serum from	Challenging dose of <i>B. typhosus</i>	Mortality in mice in 72 hours	Serum from	Challenging dose of <i>B. typhosus</i>	Mortality in mice in 72 hours
B. Nair (human volunteer).	100 M.L.D. 1,000 M.L.D.	3/4 2/4	Subramania Iyer (human volunteer).	100 M.L.D. 1,000 M.L.D.	0/4 2/4
Rabbit no. 1 ..	100 M.L.D. 1,000 M.L.D. 10,000 M.L.D.	3/4 3/4 3/4	Rabbit no. 2 ..	100 M.L.D. 1,000 M.L.D. 10,000 M.L.D.	3/3 3/3 3/3
Subramanian (human volunteer).	100 M.L.D. 1,000 M.L.D.	1/3 2/4	Madhava Rao (human volunteer).	100 M.L.D. 1,000 M.L.D. 10,000 M.L.D.	0/4 3/4 2/4
Rabbit no. 12 ..	100 M.L.D. 1,000 M.L.D. 10,000 M.L.D.	2/4 1/4 1/4	Rabbit no. 9 ..	100 M.L.D. 1,000 M.L.D. 10,000 M.L.D.	1/4 1/4 2/4
			D. Rao (human volunteer).	100 M.L.D. 1,000 M.L.D. 10,000 M.L.D.	4/4 3/4 4/4

In the mortality column, the bottom figure is the number of mice employed in the experiment and the top figure is the number of mice which died in 72 hours. Thus 3/4 means that 3 mice died in 72 hours out of 4, i.e. one survived.

5. Mouse protection tests were done with immune serum from two rabbits and two human volunteers immunized by the intradermal method. Similar tests were done with immune serum from two rabbits and three human volunteers immunized by the subcutaneous method. The protective value in mice in both groups was approximately the same.

Acknowledgment

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ROENTGEN THERAPY IN TUBERCULOUS CERVICAL LYMPHADENITIS

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RADICAL operation of glands in the neck leaves very bad scars, and moreover it is practically impossible to remove all the infected glands. Recurrence rate after radical operation is also high.

Moreover, the cosmetic results of surgical excision are not significantly better than those of untreated cases. Good cosmetic result is really the first aim of treatment. Thompson (1936, 1937) collected 2 series of cases, 43 and 35 respectively, in which tuberculous cervical glands liquefied and broke down spontaneously owing to the neglect and refusal of the treatment in the earlier stages and compared the cosmetic results with those of surgical excision.

1st series of 43 cases

Cosmetic results	Good	Moderate	Bad
Surgical excision (43 cases).	21% (9 cases)	30% (13 cases)	49% (21 cases)
Spontaneous ulceration (43 cases).	30% (13 cases)	35% (15 cases)	35% (15 cases)

2nd series of 35 cases

	Surgical excision	Spontaneous ulceration
Good ..	8	8
Moderate ..	15	12
Bad ..	12	15

It is clear from these figures that the results of what may be termed natural cure though occurring under the worst possible hygienic conditions are far from being calamitous and indeed actually superior to expert surgery. But this does not mean that such cases should go untreated.

Orley (1936) got excellent cosmetic results from small repeated doses of x-rays. Howarth (1924) got good results with x-rays when sinuses existed. Smith (1922) obtained good results with sun light. Mosdzein considers a combined x-ray and sun-ray treatment as most favourable.

I have treated nearly 200 cases of T.B. glands in the neck by x-ray therapy. The cases were diagnosed as tuberculous: (1) On clinical grounds; on long standing history of sinuses, etc. (2) On blood examination: (a) total and differential count, (b) E.S.R. (1st hour Westergren method). (3) By tuberculin test. (4) By other examinations: (a) skiagram or screening of the chest, (b) search for a septic focus in the drainage area of the lymph glands of the neck, i.e. scalp, ears, nose, throat and teeth. In doubtful cases the diagnosis was confirmed by (a) examination of aspirated or curetted material and (b) biopsy.

Early cases were treated by superficial x-rays (K.V. 85, filter 3 mm. Al., milliamperage 5, time 4½ minutes, distance 20 cm., size of the field sufficient to include the area between the middle line in front, anterior border of the trapezius behind, upper border of the clavicle below and a line drawn at the level of the zygomatic arch above, number of the Roentgen units was 150 per exposure) and advanced cases were treated by deep x-ray (K.V. 300, filter 1 mm. Al., ½ mm. cμ, milliamperage 4, time 10 minutes, distance 50 cm., size of the field 15 × 15 cm., Roentgen units 150 per exposure). One exposure was given per week for unilateral cases and 2 for bilateral cases for 6 weeks. This was termed as one course (total dosage for unilateral cases 900r and for bilateral cases 1800r). This course was repeated after 6 to 8 weeks' interval. Most of the cases needed 2 or 3 courses. This treatment gave remarkably good results.

An account of 8 striking cases treated in this series by x-ray therapy follows with photographs, taken before and after treatment.

Case no. 1

P. K., age 15, Hindu female (unmarried). Date of coming under observation 21st May, 1945.

Complaints: (1) Enlargement of the glands on the left side of the neck; duration 9 months. (2) Malarial fever; duration 1 month.

Mother died of tuberculosis of the lungs and one of her brothers was suffering from tuberculosis of the hip joint.

She got enlargement of the glands on the left side about 2½ years ago. She got herself operated upon at Sir Ganga Ram Hospital, Lahore, about two years back. The glands recurred six months after the operation as two or three small nodules and she came to the Mayo Hospital, Lahore, for Roentgen therapy.

The patient was otherwise quite healthy, weight 80 pounds. Local examination showed a swelling below and behind the angle of the jaw 3 inches × 4 inches under a scar 4 inches × ½ inch of the previous operation on the left side of the neck. This mass of glands was matted. Blood examination: (a) Total W.B.Cs. 8,000, polymorphs 55 per cent, lymphocytes 40 per cent, large mononuclears 5 per cent, eosinophiles nil, (b) E.S.R. 28 (1st hr. Westergren). Screening of the chest negative. Tuberculin test 1:10,000 (+++).

She was given two courses of superficial x-ray therapy at an interval of 2 months. After the end of the first course the glandular swelling was examined and it measured 2 inches × 1 inch. At this time her weight was 100 pounds and her E.S.R. was 9 mm. (1st hr. Westergren method). At the end of the second course the glands were no longer palpable and her E.S.R. remained normal (8 mm.). The fever which she had to start with subsided after 2 days of quinine administration (figures 1 and 2; plate XVIII).

Case no. 2

S. K., age 14, Sikh female (unmarried). Date of coming under observation 15th July, 1945.

Complaints: (1) A swelling on the right side of the neck; duration 1 year. (2) A swelling in the left axilla; duration 1½ years.

The swelling in the axilla was first to appear and it was followed two months afterwards by the enlargement of the glands in the neck. She carried out conservative treatment since the first appearance of the enlargements with no relief and she left her studies on account of her illness. She was fairly built and was otherwise quite healthy.

Weight 80 pounds. Local examination showed a mass 4 inches × 5 inches under the upper part of the right sternomastoid and an irregular swelling 4 inches × 3 inches in the right posterior triangle. The glands were matted together. The axillary mass measured 5½ inches × 4 inches. Blood examination: (a) Total W.B.Cs. 8,125; polymorphs 65 per cent, lymphocytes 30 per cent, large mononuclears 3 per cent, eosinophiles 2 per cent. (b) E.S.R. 19 mm. Skiagram of the chest negative. Tuberculin test 1:10,000 (+++). Some of the glands were removed

from the axilla and were sent to the pathology department for examination and they turned out to be tuberculous. She was given two courses of superficial x-ray therapy. At the end of the first course the axillary swelling was reduced to 2 inches \times 1 inch and the swelling in the neck was hardly palpable (1 inch \times 1 inch and $1\frac{1}{2}$ inches \times $\frac{3}{4}$ inch). She gained 20 pounds in weight and joined the school. She was again put on superficial x-ray therapy after $1\frac{1}{2}$ months and was discharged cured on 20th November, 1945. Her E.S.R. was 8 mm. at the end of the first course and never rose up again except once during the second course when it became 19 mm. She had then a temperature. The E.S.R. again came to 8 mm. after the end of a week (figures 3 and 4, plate XVIII).

Case no. 3

V. V., age 25, Hindu female (married). Date of coming under observation 25th August, 1945.

Complaints: (1) Enlargement of the lymph glands on both sides of the neck, duration 2 years. (2) Slight fever, duration $1\frac{1}{2}$ months. (3) Cough, duration one month. (4) Frequent attacks of bad cold, duration 6 months. (5) Loss of appetite, general weakness and indisposition to work, duration 6 months.

About 2 years back she noticed a swelling on the right side of the neck just below and behind of the angle of the mandible. This swelling went on increasing in spite of all sorts of treatment carried out by her till the glands in other parts of the neck also became palpable. She was quite intelligent and fairly well built. Weight 95 pounds. Local examination showed: I Right side—(1) A swelling 4 inches \times 5 inches just below and behind the angle of the mandible. (2) A swelling 4 inches \times 3 inches deep to the lower half of the sternomastoid. (3) A swelling 1 inch \times 1 inch behind the pinna. (4) A mass of gland 3 inches \times $3\frac{1}{2}$ inches in the supra-clavicular region just behind the posterior border of the sternomastoid muscle. All the swellings contained matted glands. II Left side—The glands formed slight nodular swellings scattered all over and were just palpable. Blood examination: Total W.B.Cs. 8,125, polymorphs 70 per cent, lymphocytes 25 per cent, large mononuclears 4 per cent and eosinophiles 1 per cent. E.S.R. 19 mm. Malarial parasites present. Skiagram of the chest negative, tuberculin test 1:10,000 (+). On biopsy the diagnosis of tuberculous lymphadenitis was confirmed. She was given two courses of deep x-rays. Her fever and bad cold disappeared after the use of the ordinary medicines. Her weight began to improve after 4 weeks. At the end of the first course she gained 10 pounds in weight and her E.S.R. became 7 mm. (1st hr. Westergren). At the end of the first course the glandular swellings were hardly palpable except that portion under the upper part of the sternomastoid

just below and behind the angle of the jaw (2 inches \times 1 inch). After the second course all the glands returned to their normal size and she improved in general health (figures 5 and 6, plate XVIII).

Case no. 4

K. B., age 30. Date of coming under observation 15th August, 1945.

Complaint: Recurrence of the glandular enlargements after a radical operation performed on right side, at Bombay, about one year back.

She was slightly pale and anæmic, weight 85 pounds. Local examination showed a mass of matted glands 3 inches \times 4 inches in the right jugular chain under a big scar of the previous operation. There was an abscess associated with a swelling 1 inch \times 2 inches in the right posterior triangle. There were scattered nodular enlargements of all the glands on both sides of the neck. Blood examination: Total W.B.Cs. 5,400, polymorphs 56 per cent, lymphocytes 40 per cent, large mononuclears 3 per cent, eosinophiles 2 per cent, total R.B.Cs. 4 millions, Hb 70 per cent, E.S.R. 22 mm. (1st hr. Westergren). Skiagram of the chest negative, tuberculin test 1:10,000 (+). On biopsy the diagnosis of tuberculous glands was confirmed. The abscess healed after three aspirations. After one course of deep x-rays, her weight increased to 100 pounds. Her E.S.R. became 8 mm. after 4 weeks. She was put on an ordinary iron mixture and her anæmia improved. The progress was uneventful and she improved in her general health. On examination on 1st November, 1945, the glandular masses had completely disappeared and the scar of the previous operation became just visible (figures 7 and 8, plate XVIII).

Case no. 5

S. D., age 25, Hindu female (married). Date of coming under observation 5th September, 1945.

Complaint: Enlargement of the glands on both sides of the neck, marked on the right side; duration 2 years.

She was fairly well built and was otherwise quite healthy, weight 100 pounds. Local examination showed: (1) A swelling 4 inches \times 5 inches just below and behind the angle of the right mandible. (2) A swelling 3 inches \times 4 inches under the lower part of the right sternomastoid muscle. (3) Small nodular swellings scattered on both sides of the neck. The swelling nos. (1) and (2) contained matted glands. Blood examination: (a) Total W.B.Cs. 5,625, polymorphs 66 per cent, lymphocytes 30 per cent, large mononuclears 1 per cent, eosinophiles 3 per cent. (b) E.S.R. 10 mm. (1st hr. Westergren). Screening of the chest negative. Tuberculin test 1:10,000 (+++). On biopsy the diagnosis of tuberculous glands was confirmed. She was given one course of superficial x-ray therapy. At the end of the treatment her

weight was 110 pounds, E.S.R. 10 mm. (1st hr. Westergren). She was discharged cured on 1st November, 1945, because all the glands returned to their normal size (figures 9 and 10, plate XIX).

Case no. 6

S., age 25, Mohammedan female (unmarried). Date of coming under observation 10th September, 1945.

Complaints: (1) Enlargement of the lymphatic glands on the right side of the neck; duration 9 months. Since one month some of the glands had softened and burst. There was a sinus giving a serous discharge. (2) Slight cough and occasional fever; duration 6 months.

She was pale and anæmic, weight 90 pounds. Local examination showed a swelling of glands 5 inches \times 4 inches under the right sternomastoid and extending into the posterior triangle. A fluctuant mass was also palpable in the upper part of the jugular chain. There was an ulcer 1 inch \times $\frac{3}{4}$ inch over the swelling, discharging pus. The blood examination: (a) Total W.B.Cs. 5,760, polymorphs 64 per cent, lymphocytes 31 per cent, large mononuclears 4 per cent, eosinophiles 1 per cent. (b) E.S.R. 11 mm. (1st hr. Westergren). Skiagram of the chest negative. Tuberculin test (+++). Examination of the aspirated material from the abscess showed no micro-organisms. She was given one course of deep x-ray therapy during which the abscess was regularly aspirated. At the end of 3 weeks her E.S.R. became 10 mm. (1st hr. Westergren) and she gained 10 pounds in weight. At the end of the treatment the glands returned to the normal size, the abscess subsided and she was allowed to go on 16th November, 1945, as cured (figures 11 and 12, plate XIX).

Case no. 7

P. C., age 7, Hindu, male child. Date of coming under observation 1st October, 1945.

Complaint: A swelling on the left side of the neck; duration one year. Child was quite healthy, weight 50 pounds. Local examination showed a swelling 3½ inches \times 3 inches consisting of large discrete gland just below and behind the left jaw and small nodular swellings just palpable in other areas on the left side of the neck; skiagram of the chest negative. Blood examination: Total W.B.Cs. 6,000, polymorphs 55 per cent, lymphocytes 40 per cent, large mononuclears nil, eosinophiles 5 per cent. E.S.R. 28 mm. (1st hr. Westergren). Stool examination: Ova of oxyuris found. Tuberculin test 1:10,000 (+++). In the beginning he was treated for oxyuris. Then he was given one course of superficial x-ray therapy. At the end of the treatment the glandular masses completely disappeared and E.S.R. came to 10 mm. (1st hr. Westergren) and he was discharged cured on 20th December, 1945 (figures 13 and 14, plate XIX).

Case no. 8

M. A., age 16, Mohammedan male (unmarried). Date of coming under observation 1st November, 1945.

Complaint: Extensive enlargement of the glands on both sides of the neck with a big scar and discharging sinuses on the right side; duration 2 years.

The patient was slender built, weight 100 pounds. Local examination showed: I Right side—(1) Just behind and below the angle of the jaw a swelling 3 inches \times 3 inches. (2) A scar 4 inches \times $\frac{1}{2}$ inch extending from behind the angle of the jaw to just above the sternum. (3) Two swellings each 1 inch \times 1 inch along the posterior border of the sternomastoid about its middle. (4) A swelling 3 inches \times 2 inches in the paratoid region. (5) There were two sinuses in the glands of the upper chain and one in the middle. The glands in the swelling no. 1 were matted together but others were quite discrete. II Left side—(1) A swelling 4 inches \times 4 inches just behind the angle of the jaw. (2) A swelling 4 inches \times 3 inches in the supraclavicular region. (3) A swelling 3 inches \times 2 inches along the posterior border of sternomastoid. The glands in all the swellings were quite discrete.

Blood examination: (a) Total W.B.Cs. 5,750, polymorphs 64 per cent, lymphocytes 31 per cent, large mononuclears 4 per cent, eosinophiles 1 per cent. (b) E.S.R. 12 mm. (1st hr. Westergren). Skiagram of the chest negative. Tuberculin test 1:10,000 (+). Biopsy of the glands confirmed the diagnosis of tuberculous glands. The sinuses were curetted and bipped. Glands on the right side belonging to the group no. 1 were removed for biopsy. He was given one course of x-ray therapy and at the end of the treatment the glands diminished markedly on the right side, the scar became insignificant and sinuses healed, but there was only slight decrease on the left side. His E.S.R. became normal, 8 mm. (1st hr. Westergren). He never turned up again for another course of treatment (figures 15 and 16, plate XIX).

Comments

X-ray treatment gives an excellent result in a month or two and strains the purse of a poor class of tuberculous community to the minimum, eradicated the disease, whether residing in the superficial or deep glands, or in between the various groups. Further, the aftermaths of conservative treatment, namely, the further dissemination of the disease, extensive adhesions to various important structures of the neck leading on to the stage of inoperability and period of treatment stretched over many years, are all eminently avoided. Roentgen therapy also surpasses the operative radical method in that that bad scar, fear of mortality and recurrence due to the liability of any focus left behind are all properly dealt with. However, I must admit that operative method has got to



Fig. 1.—Case 1. Before treatment.



Fig. 2.—Case 1. After treatment.



Fig. 3.—Case 2. Before treatment.



Fig. 4.—Case 2. After treatment.



Fig. 5.—Case 3. Before treatment.



Fig. 6.—Case 3. After treatment.



Fig. 7.—Case 4. Before treatment.



Fig. 8.—Case 4. After treatment.



Fig. 9.—Case 5. Before treatment.



Fig. 10.—Case 5. After treatment.



Fig. 11.—Case 6. Before treatment.



Fig. 12.—Case 6. After treatment.

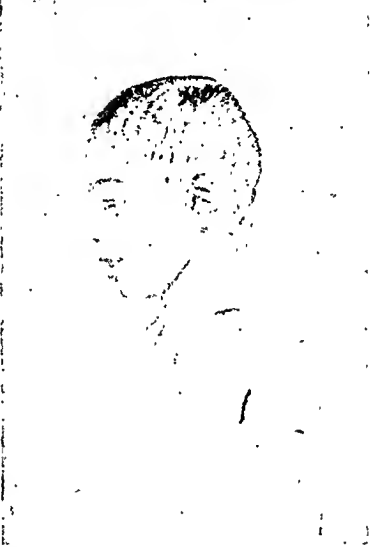


Fig. 13.—Case 7. Before treatment.

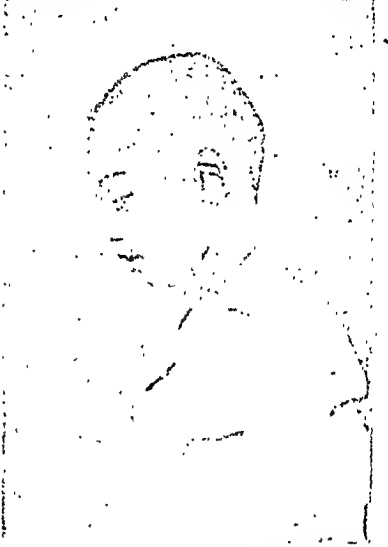


Fig. 14.—Case 7. After treatment.



Fig. 15.—Case 8. Before treatment.



Fig. 16.—Case 8. After treatment.

PLATE XX

A MODIFIED BONE GRAFT FOR ARTHRODESIS
WRIST : I. R. BAZLIEL. (O. A.) PAGE 527

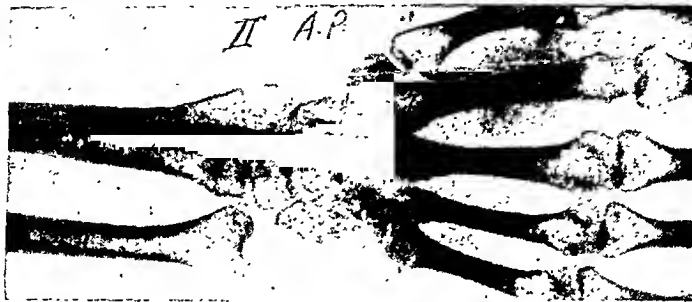


Fig. 2.



Fig. 3



Fig. 4.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

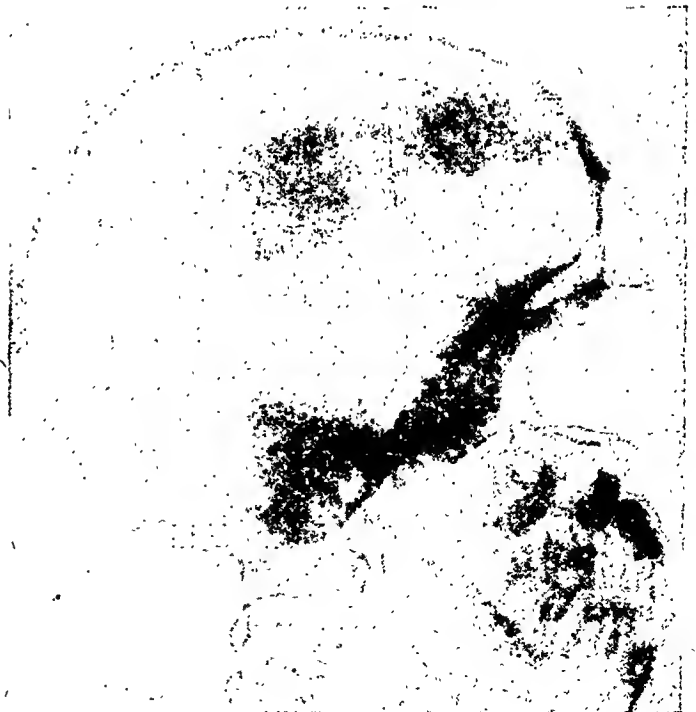


Fig. 5.

be resorted to in cases who are refractory to x-ray therapy.

Summary

I have reported 8 cases of T.B. glands in the neck. Excellent results were obtained in all cases except one who did not turn up for further treatment. A short comment on the treatment is presented.

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A MODIFIED BONE GRAFT FOR ARTHRODESIS WRIST

By I. R. BAZLIEL

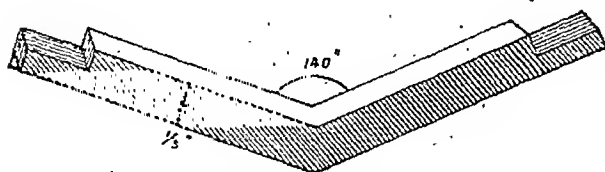
MAJOR, I.M.S./I.A.M.C.

Surgical Specialist, Orthopaedic Wing, I.M.H., Lucknow, U. P., India

DURING 1944-46 over a dozen cases of traumatic osteo-arthritis of wrist, either due to gunshot wounds or simple fractures involving the articular surfaces, had to be treated in this centre surgically. In every case prolonged physiotherapy and rehabilitation exercises had been instituted before deciding upon surgical interference to estimate the functional disability. Persistent pain and tenderness had been a guiding factor in every case tackled surgically.

Having employed 'Britain's' technique for arthrodesis of the wrist in the first few cases, the difficulty of giving an adequate amount of dorsiflexion to the wrist was invariably experienced. A forced dorsiflexion usually lifted the graft out of the central portion of the bed. Consequently, I have ventured to modify the usual Britain's graft by cutting it angular instead of straight (see figure 1), and have used it in eight cases with remarkable success.

Figure 1.



No extra difficulty is experienced in cutting this graft out of the tibia with Albee's saw. The operation technique is the same as described by Britain. After the gutter has been made in the radius and the carpus, the wrist is held by an assistant in the required dorsiflexion position and accurate measurement of the gutter on either side of the wrist joint is taken. The angled graft is marked on the tibia with the usual steps at its ends. When the graft is precisely fitted in the

gutter with the convex angle down in the wrist joint, the wrist is automatically kept in dorsiflexion.

Another advantage is that in optimum dorsiflexion of the wrist the grip is much stronger and functional result far better than when the wrist is arthrodesed in a neutral position.

The accompanying x-ray pictures (see figures 2, 3 and 4, plate XX) show an arthrodesis performed for flail wrist, with angular graft, taken 3 months after the operation.

GANGOSA

By K. D. LAHIRI, M.B., B.S.

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GANGOSA is a Spanish word meaning muffled voice. The Spanish Commission in 1928 separated gangosa from leprosy. It is associated with yaws usually but in the case under report yaws could not be proved. Authorities have found it impossible to decide whether gangosa is due to syphilis or yaws. Histopathological studies have proved that gangosa has no relationship with leprosy and they do not suggest syphilitic origin but the lesions gave evidence of a chronic inflammatory condition in which there was a tendency to destruction of newly formed tissue with little tendency to invasion by micro-organisms. Hallenberger believes that rhinopharyngitis mutilans belongs to the syphilis-frambæsia group and thinks it as a late lesion of frambæsia.

Gangosa generally starts as a patch of membrane in the soft palate. This membrane rapidly becomes honeycombed and in 3 to 4 days a deep ulcer appears underneath the membrane. This ulcerating process extends from within outwards quickly destroying on its way soft parts giving a funnel-shaped appearance. The nasal duct is prone to be attacked and through this the disease spreads and produces mutilation of the face.

Case report.—Ganga Sao, Hindu male, 45 years old, married, has 3 living children, is an inhabitant of Bihar, and is a shopkeeper by profession. History of having had a sore penis following an extra-marital contact about 17 years back and had only two injections of N.A.B. for joint pain 10 years back.

He had no skin rash but 4 years back he noticed a rough area on his soft palate which went on increasing very rapidly until the whole of the soft palate and a part of the hard palate sloughed off and nasal twang appeared in about 7 months' time. He was under some homœopath at this time. Only 2 years back he noticed a small swelling like that of a big pea on the left side of his nose which in about 4 months' time became as big as the betel-nut and few weeks after softened at the top when a barber operated on him and put in a gauze. The wound healed up in 3 months' time leaving an opening on the cheek

and nose and in talking he has to cover that opening with his left hand. He came for treatment here in 1946.

The photograph (see figure 1, plate XXI) shows a funnel-shaped opening on his face leading into the rhinopharynx. Blood W.R. repeatedly has been positive even after routine anti-syphilitic therapy (Lahiri, 1945) which checked further destruction of the ulcer on the left lower leg (see figures 2 and 3, plate XXI). This ulcer had no special characteristics, looked more or less like Naga Sore and did not have the typical hunched out look of a gummata. The skiagrams of the skull (see figures 4 and 5, plate XXI) do not show much in support of the yaws in gangosa but the destruction of the maxilla and palate are seen. Penicillin was also tried (Lahiri, 1947) but not with much effect, and without altering the serological reaction of the patient.

I am thankful to the Superintendent for permission to publish this paper and to Dr. Nawab and Major Sinha for help.

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STUDIES ON GASTRIC ANALYSIS WITH DIFFERENT TEST MEALS*

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and

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GASTRIC analysis is of value in the investigation not only of gastro-intestinal diseases but also of other conditions, viz anæmias, pellagra, asthma, etc. In this test, after the removal of the residual juice, the gastric glands are excited to secrete by the ingestion of a test meal of which oatmeal gruel is the old standard one. It has however certain disadvantages: it takes considerable time to prepare the meal; the patient finds it inconvenient to swallow with a tube in the mouth; a pint of gruel causes much dilution of the gastric juice at least in the first hour; and at times difficulty is experienced in drawing the thick samples through the tube. More recently, alcohol test meal has replaced the gruel meal. In this country, Napier, Chaudhuri and Rai Chaudhuri (1938) used the alcohol meal

in the study of gastric acidity in health and disease of Indians. Mangalik, Goel and Mangalik (1942) made a comparative study between the gastric response to alcohol and gruel meals showing that alcohol is an equally good or even better gastric stimulant. The meal consists of 100 c.c. of 7 per cent alcohol. It is easy to prepare and easy to pass directly into the stomach through the tube; the samples are clear and are withdrawn with ease while there is very much less dilution of the gastric juice. It is a gastric stimulant, although, of course, not a natural one at least in most Indian patients. Not infrequently, objections are raised by certain patients against alcohol being put in their stomach. The object of the present study was therefore to perform gastric analysis with various common articles of meal and compare the results with those of the alcohol meal.

This report deals with 200 gastric acid secretion studies, performed on 100 patients suffering from different diseases, who were admitted into the Carmichael Hospital for Tropical Diseases. The series was a mixed one as regards race, sex and age. It was divided into ten groups of ten patients each. Each of the first nine groups was given both types of meal—the alcohol meal first and then at an interval of a few days the meal to be tested, and the results were compared. In the tenth group the same alcohol meal was repeated the second time with a purpose to seeing if there were any variations from the first observations. The following is the list of different meals used:—

- (1) Tap water.
- (2) Distilled water.
- (3) Pyrogen-free water.
- (4) Normal saline.
- (5) Pepper water.*
- (6) Tea infusion.
- (7) Milk.
- (8) Olive oil.
- (9) 'Rasam'.†

Method of study

All the subjects were ambulatory. They were permitted a light supper the evening before and were given four charcoal tablets at 10 p.m. They were not allowed any food next morning until the test was done. The stomach was first emptied of the fasting contents and the meal (100 c.cm. each) was administered through Ryle's

* Pepper water is prepared by adding 0.5 gm. of powdered pepper to 100 c.cm. of distilled water and shaken well before giving the meal.

† Ripe tamarind pulp is soaked in water for half an hour. Adequate amount of 'masala' powder (a mixture of pepper, chilli, turmeric, dhania, chana dal powder, etc.) and salt added. This is then allowed to boil till the right flavour begins to emanate, when dal (arhar) water, previously cooked, is added. It is removed from fire. The preparation is now flavoured with fried mustard, etc. The supernatant fluid is 'rasam'.

* A paper presented at the 34th Session of the Indian Science Congress held at Delhi in 1947.

tube. Then quarter-hourly samples of gastric contents were withdrawn for two hours. Each fraction was titrated with 0.1 normal sodium hydroxide for free and total hydrochloric acid, Topfer's reagent (0.5 per cent solution of dimethyl amino-azo-benzol in alcohol) and phenolphthalein (1 per cent solution in alcohol) being used respectively as indicators.

Acidity standards

The cases were classified on the basis of their acid response, as shown below, in accordance with the grouping suggested by Napier, Chaudhuri and Rai Chaudhuri (1938) and routinely followed in this institution.

Acid response	Free HCl in c.cm. per 100 c.cm. gastric contents
1	1.0
2	2.0
3	3.0
4	4.0
5	5.0
6	6.0
7	7.0
8	8.0
9	9.0
10	10.0
11	11.0
12	12.0
13	13.0
14	14.0
15	15.0
16	16.0
17	17.0
18	18.0
19	19.0
20	20.0
21	21.0
22	22.0
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35	35.0
36	36.0
37	37.0
38	38.0
39	39.0
40	40.0
41	41.0
42	42.0
43	43.0
44	44.0
45	45.0
46	46.0
47	47.0
48	48.0
49	49.0
50	50.0
51	51.0
52	52.0
53	53.0
54	54.0
55	55.0
56	56.0
57	57.0
58	58.0
59	59.0
60	60.0
61	61.0
62	62.0
63	63.0
64	64.0
65	65.0
66	66.0
67	67.0
68	68.0
69	69.0
70	70.0
71	71.0
72	72.0
73	73.0
74	74.0
75	75.0
76	76.0
77	77.0
78	78.0
79	79.0
80	80.0
81	81.0
82	82.0
83	83.0
84	84.0
85	85.0
86	86.0
87	87.0
88	88.0
89	89.0
90	90.0
91	91.0
92	92.0
93	93.0
94	94.0
95	95.0
96	96.0
97	97.0
98	98.0
99	99.0
100	100.0

Hyperchlorhydria .. Over 65

Normal range—

(a) High \therefore Over 45

(b) Medium .. 25 to 45

(c) Low .. Under 25

Hyperchlorhydria .. Under 10

Achlorhydria .. No free HCl

No reference to the total acidity is made as it runs more or less parallel with the free acidity.

Results

These are shown in tables I and II.

Table I shows the result with each meal as compared with alcohol. It will be noticed that both tap water and pyrogen-free water gave the same results as alcohol in 70 per cent of the cases. There were variations in the remaining 30 per cent, but these variations were of minor degree. Thus in one person who was 'high normal' with alcohol gave 'normal' reaction with tap water and in another person a 'normal' from alcohol became 'high normal' with pyrogen-free water. It may be said that 30 per cent is a large figure but it must be remembered that the number of cases in each group was small. It is interesting to note that the same minor variations were observed when alcohol was used as the second test meal.

In the case of other substances which were tested we found that the differences from alcohol were marked with tea infusion and *rasam* and intermediate with distilled water, pepper water, normal saline, milk and olive oil. Incidentally, compared with alcohol, tea, milk, olive oil and normal saline tended to depress the acidity, while *rasam* slightly increased the acidity in 70 per cent of the cases.

Table II represents the maximum and mean acid secretions in the different groups. The curves of mean acidity with tap water and pyrogen-free water (figures I and II) run closely

TABLE I

Group	Test meal	1	2	3	4	5	6	7	8	9	10
1	Alcohol .. Tap water ..	Hyper Hyper	High N N	Hyper Hyper	Hypo Hypo	Hyper Hyper	Low N Low N	High N High N	N High N	Hyper Hyper	Hypo Achlor
2	Alcohol .. Pyrogen-free water ..	N N	N High N	High N N	N Low N	N N	Low N Low N	N N	High N High N	Hyper Hyper	Hyper Hyper
3	Alcohol .. Normal saline ..	N N	Low N Hypo	N Low N	Hyper Low N	High N Hyper	Achlor Achlor	N High N	High N N	High N High N	High N High N
4	Alcohol .. Pepper water ..	High N High N	N N	Low N Hypo	High N N	High N High N	Hyper N	N Hyper	N High N	N N	High N Hyper
5	Alcohol .. Distilled water ..	Hyper Hyper	N N	N N	Hypo Low N	High N N	N N	N Low N	High N High N	High N Hyper	N High N
6	Alcohol .. Tea infusion ..	High N High N	High N High N	Low N Low N	Hyper High N	High N N	Hyper N	N Low N	Hyper High N	Hyper High N	High N N
7	Alcohol .. Milk ..	N High N	High N High N	N N	Low N Achlor	High N Achlor	Hyper N	Hyper Hyper	High N N	N N	N Achlor
8	Alcohol .. Olive oil ..	Hyper High N	High N Hyper	High N High N	Hyper Hyper	High N High N	High N Hypo	High N Hyper	High N N	Hyper Hyper	High N N
9	Alcohol .. 'Rasam' ..	Low N N	Low N N	N High N	High N N	Low N N	N N	Low N High N	N High N	High N Hyper	N N
10	Alcohol .. Alcohol ..	Hyper Hyper	High N Low N	N High N	N N	Low N N	N N	Low N Low N	High N High N	N N	N N

Achlor	= Achlorhydria.
Hypo	= Hypochlorhydria.
Low N	= Low normal.
N	= Normal.
High N	= High normal.
Hyper	= Hyperchlorhydria.

TABLE
Showing the maximum and mean

Time	GROUP I				GROUP II				GROUP III				GROUP IV				GROUP V			
	Alcohol		Tap water		Alcohol		Pyrogen-free water		Alcohol		Normal saline		Alcohol		Pepper water		Alcohol		Distilled water	
	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean
1 hr.	42	15	36	17	22	12	48	14	44	14	32	9	42	14	44	18	44	11	20	5
1 1/4 hr.	72	35	64	36	52	25	72	26	64	25	56	15	56	25	42	23	48	26	26	16
1 1/2 hr.	68	35	102	35	58	25	72	21	80	32	66	24	108	38	42	19	80	36	44	19
1 3/4 hr.	94	37	70	33	90	33	52	24	50	33	40	19	68	33	52	18	60	32	44	23
2 hrs.	88	33	60	28	60	25	84	28	42	24	42	20	68	27	50	25	46	23	64	24
2 1/4 hrs.	88	30	80	32	52	24	56	26	40	19	64	21	62	28	50	21	64	25	66	25
2 1/2 hrs.	64	28	88	29	72	25	46	22	48	21	60	27	68	25	50	28	42	19	66	25
2 3/4 hrs.	80	30	98	37	68	31	64	30	40	23	60	26	60	28	62	33	50	18	50	26
3 hrs.	72	20	78	38	78	28	56	30	64	29	60	24	60	26	68	37	46	17	74	38

Curves of mean acidity with four different test meals as compared with alcohol.

Figure V shows results with the same alcohol meal repeated.

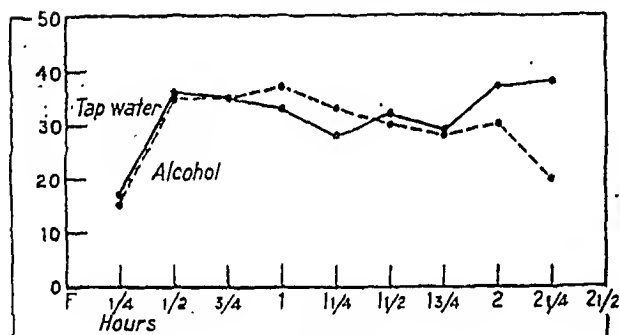


FIG I.

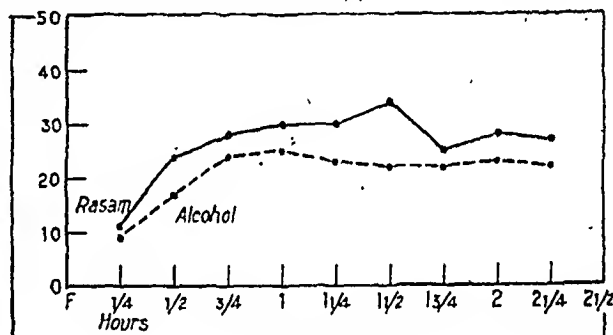


FIG IV.

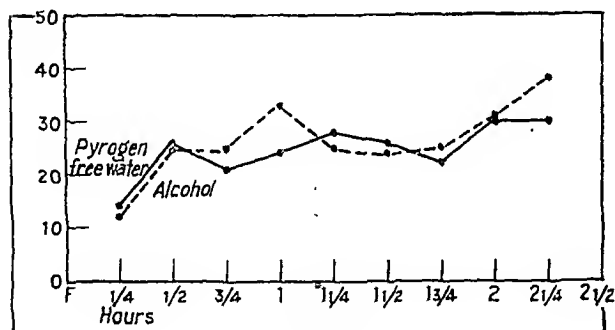


FIG II.

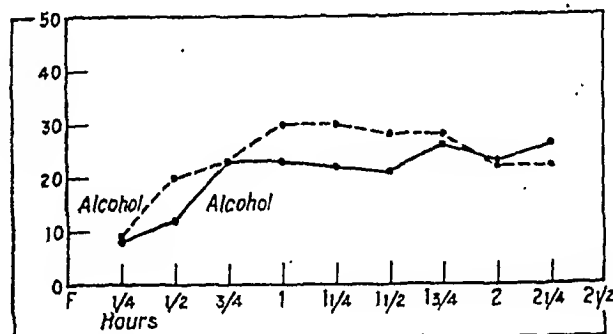


FIG V.

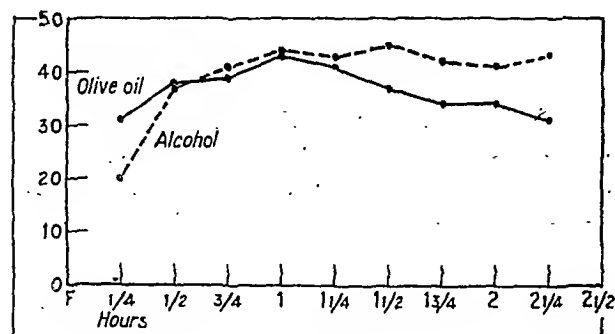


FIG III.

parallel with that of alcohol. Olive oil gave similar results during the first hour but eventually controlled the secretion, and during the second hour there was some divergence (figure III). With *rasam* there was higher acidity throughout the period of observation (figure IV). With alcohol tested for the second time the mean results almost corresponded with those of the first observations (figure V).

As regards maximum acidity, tap water and pyrogen-free water were the only two substances which approached the high level obtained with alcohol, and the peak was reached within 1 1/2 hours.

II

acid secretion in different groups

GROUP VI				GROUP VII				GROUP VIII				GROUP IX				GROUP X			
Alcohol		Tea infusion		Alcohol		Milk		Alcohol		Olive oil		Alcohol		'Rasam'		Alcohol		Alcohol	
Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean	Max.	Mean
64	23	36	16	80	20	26	5	52	20	70	31	34	9	36	11	42	9	22	8
66	39	64	29	66	29	30	12	68	37	70	38	52	17	54	24	48	20	30	12
72	40	54	32	78	36	58	18	56	41	74	39	55	24	54	28	60	23	48	23
70	39	52	31	80	28	66	29	70	44	72	43	54	25	64	30	62	30	50	23
66	34	52	19	80	31	54	24	64	43	74	41	50	23	72	30	60	30	44	22
62	27	64	21	64	25	46	23	78	45	62	37	40	22	74	34	64	28	50	21
60	24	62	26	88	24	50	22	84	42	66	34	52	22	76	25	64	28	66	26
52	27	44	26	82	30	38	19	88	41	60	34	54	23	80	28	66	22	62	23
60	29	52	31	60	29	58	21	72	43	66	31	54	22	60	27	60	22	66	26

Conclusion

Gastric analysis is not an exact procedure for it is dependent on a series of factors which change in a given individual from time to time but, if carefully carried out, it is a valuable aid to diagnosis. The composition of the meal is one of the variable factors, and the simpler it is the better. If we accept alcohol as the standard meal, then judging from the above results, it may be replaced by ordinary water. Its advantages are obvious. But our results need confirmation from a larger series of cases.

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SOME CONSTITUENTS OF NORMAL BLOOD

A STUDY BASED ON THE EXAMINATION OF THE BLOOD OF 50 PERSONS, 25 MEN AND 25 WOMEN

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QUANTITATIVE estimation of some constituents of blood has become a common practice in clinical medicine. In order to have a definite idea of the extent of the severity of the pathological condition, standard values for the constituents estimated in normal human blood are essential. The values usually found in the textbooks refer to the Westerners, worked out by the workers of the West (e.g. Folin, Wu, Van Slyke;

Brown, White Horn and many others). For the first time in India workers of the Haffkine Institute, Bombay, worked a few normals for Indians in general and Bombayites in particular (Sokhey and others, 1937, 1938). Subsequent work done at Calcutta, Madras and Bangalore produced some normals for the local or the provincial people of the respective places. So far no such figures were available for Central India and hence the undertaking of this work.

The students from the King Edward Hospital Medical School and nurses attached to the King Edward Hospital, were the subjects of our examination. These were young men and women, apparently healthy and varying between eighteen and twenty-eight years. These represented persons from the lower middle class and upper lower class. Majority of these are vegetarians, a few accustomed to eggs or meat now and then and a negligibly small number habituated to either meat or eggs daily.

The subjects under examination were allowed to have their usual diet at the night previous to their blood being drawn. On the morning of the examination day they were instructed to have if they chose only a cup of tea and three hours after this their blood was collected in specially prepared oxalated bulbs containing 2 mg. of neutral potassium oxalate per c.c. of blood as anticoagulant. It was also carefully investigated that the person concerned had not taken any sulphur or other drugs within last few months prior to his examination. Ten c.c. of venous blood were collected for the various examinations carried out, care being taken to use a dry sterilized syringe. All estimations were finished within two hours of the collection of the blood.

Blood from finger tips by a prick was collected in standard German pipettes for the cell counts and hæmoglobin estimation by Hellige's hæmometer.

TABLE

Serial number	Name	Age, years	Height, ft. in.	Weight, lb.	Diet	W.B.C. count	R.B.C. count	Hæmoglobin, gm. Hellige	Blood urea, mg. per 100 c.c. blood	Blood sugar, mg. per 100 c.c. blood	Blood chlorides, As sodium chlorides, mg. per 100 c.c. blood	Plasma proteins, gm. per 100 c.c.	Hæmatocrit value
Men													
1	V. K. D. . .	23	5 4	107	V. D.	4,900	4,940,000	16.15	26.78	74.07	444.0	7.2	46
2	D. S. R. . .	28	5 7	130	V. D.	7,700	5,866,000	14.28	22.55	80.00	448.0	6.5	44
3	G. G. S. . .	21	5 7	102	V. D.	9,850	5,640,000	15.30	23.80	83.33	416.0	7.2	46
4	S. R. K. . .	23	5 5	111	V. D.	7,100	5,140,000	15.30	22.16	83.33	430.0	7.2	46
5	B. K. J. . .	23	5 9	128	V. D.	5,750	5,546,000	15.30	24.30	76.92	416.0	7.8	44
6	M. Mand . .	23	5 8	118	M. D.	6,600	5,566,000	14.28	23.12	66.66	412.0	7.2	50
7	V. K. M. . .	23	5 6	100	V. D.	7,950	5,326,000	16.15	25.81	80.00	450.0	7.2	46
8	J. S. M. . .	23	5 3	86	V. D.	7,500	5,146,000	16.15	25.40	99.00	444.0	7.2	46
9	W. R. K. . .	23	5 7	129	V. D.	10,150	4,800,000	14.28	19.75	66.66	436.0	6.5	45
10	V. T. K. . .	21	5 10	143	V. D.	6,250	6,886,000	17.68	26.40	91.28	410.0	6.2	49
11	M. M. C. . .	23	5 7	120	V. D.	6,100	4,766,000	13.94	21.42	97.56	418.0	6.5	45
12	B. N. Z. . .	21	5 5	116	M. D.	5,400	5,013,000	14.11	21.57	89.63	410.0	7.2	44
13	S. V. T. . .	24	5 5	103	V. D.	7,950	3,600,000	12.75	25.70	76.95	498.0	7.2	38
14	R. R. B. . .	21	5 5	95	V. D.	510	5,540,000	14.45	22.16	71.43	416.0	7.8	49
15	S. P. N. . .	22	5 4	154	M. D.	10,050	6,106,000	16.32	35.70	111.11	468.0	6.5	51
16	B. D. H. . .	22	5 4	136	N. D.	7,400	5,966,000	16.83	36.73	105.26	460.0	6.5	45
17	K. P. G. . .	23	5 9	152	V. D.	6,000	5,913,000	15.93	21.28	93.61	436.0	7.8	44
18	M. P. K. . .	23	5 5	113	V. D.	10,900	6,253,000	16.83	20.87	67.79	432.0	6.5	45
19	T. P. S. . .	23	5 4	128	V. D.	5,300	5,420,000	14.96	20.21	66.66	418.0	6.5	45
20	M. G. W. . .	26	5 6	146	V. D.	9,550	4,866,000	14.45	20.47	101.00	430.0	6.5	48
21	V. G. W. . .	23	5 3	126	V. D.	7,850	4,506,000	15.30	20.08	93.75	436.0	6.5	48
22	N. R. N. . .	24	5 7	126	V. D.	4,450	5,206,000	15.47	21.94	85.47	436.0	6.5	48
23	B. L. G. . .	25	5 5	124	V. D.	7,150	5,606,000	16.83	29.18	72.20	410.0	7.2	46
24	M. L. Y. . .	23	5 6	117	V. D.	7,300	5,206,000	16.49	31.35	74.08	440.0	7.2	50
25	D. K. K. . .	22	5 5	123	V. D.	6,350	5,240,000	14.11	22.16	95.23	420.0	7.2	46
AVERAGES						7,248	5,354,000	15.35	24.43	84.24	433.3	6.95	46.16
Women													
1	T. B. T. . .	22	5 0	88	V. D.	6,750	5,020,000	14.450	19.96	90.90	480.0	6.5	37
2	M. S. T. . .	24	4 11	103	V. D.	12,050	5,826,000	12.580	19.71	83.33	440.0	7.2	38
3	M. K. B. . .	21	5 2	100	M. D.	8,850	3,900,000	14.450	26.67	76.92	460.0	7.2	47
4	M. E. B. . .	18	5 0	93	M. D.	7,070	4,540,000	14.450	22.76	90.09	441.0	6.5	40
5	S. V. D. . .	24	5 2	94	V. D.	6,700	3,260,000	10.880	30.32	87.33	510.0	6.5	28
6	M. M. D. . .	23	5 0	110	M. D.	8,100	4,933,000	15.300	33.83	78.12	485.0	7.2	44
7	S. J. . .	19	5 3	99	M. D.	7,300	4,060,000	13.600	39.19	77.84	400.0	6.5	40
8	M. E. D. . .	19	4 11	108	M. D.	7,000	4,066,000	11.900	33.60	68.96	476.0	7.2	35

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SEROLOGICAL TECHNIQUE (contd.)

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The Cerebrospinal Fluid

Charging of tubes for cerebrospinal fluid.—The fluid is not inactivated. Greater care, therefore, is necessary in its preservation than in the preservation of the serum.

Seven tubes in a row running from left to right, not in a column from front to backwards, are used and charged as follows:—

	FOR CONTROL			FOR ANTIGEN NO. 1 OR NO. 3		FOR ANTIGEN NO. 2	
	1st tube	2nd tube	3rd tube	4th tube	5th tube	6th tube	7th tube
CSF undiluted ..	2 vol.	1 vol.	2 vol.	1 vol.	2 vol.	1 vol.	2 vol.
1 vol. of antigen ..	..	No. 4	No. 4	No. 1 or No. 3.	No. 1 or No. 3.	No. 2	No. 2
1 vol. comp. dil. containing : Antigen and comp. dil. are mixed as before for serum.	2 MHD	2 MHD	2 MHD	3 MHD	3 MHD	4 MHD	4 MHD
Saline ..	1 vol.	..	..	..	..	..	..

The rest of the procedure is the same as for serum.

It will be observed that the 5 MHD tube, as used in the serum test, is not put up.

Reading of the results for cerebrospinal fluid.—This is done as in the case of the serum (i) immediately and (ii) after the tubes have been in the ice-box overnight. A poor \pm (poor deposit and no decrease in the colour of the supernatant fluid) and a ?—, of course, are not significant.

Record and report for cerebrospinal fluid.—One difference between the reaction of the serum and that of the CSF is observed: *Anticomplementary titre of the control is low or nil.* One difference between the report on the serum and that on the CSF is made: *Inhibition of hæmolysis in the tubes containing 2 volumes of undiluted CSF, even when complete, is not accepted as a positive reaction unless there is also a definite inhibition of hæmolysis (frankly*

\pm at least) in the tube containing 1 volume of the fluid.

Due to these differences the significant combinations are not as many as those in the test for serum. The results are recorded and reported as follows:—

- +++, positive, strongly .. When complete inhibition of hæmolysis occurs with antigen no. 2 in one or both tubes, subject to the provision concerning 1 volume.
- ..
- ++, positive .. When complete inhibition of hæmolysis occurs with antigen no. 1 or no. 3 in both tubes.
- +, positive, weakly .. When the inhibition is complete with antigen no. 1 or no. 3 with 2 volumes of CSF and partial but well marked with 1 volume.
- \pm , doubtful .. When partial but well-marked inhibition occurs in one or both tubes with antigen no. 1 or no. 3.
- , negative .. When no inhibition or inhibition of poor quantity occurs with antigen no. 1 or no. 3.

A strong inhibition with antigen no. 4 lends support to a weaker inhibition with antigens nos.

1 and 3, which might otherwise be considered not well marked or of poor quality.

Anomalous Reactions

Anomalous reactions such as more fixation with 5 MHD than with 3 MHD do not appear to occur in the LCF. Nor does a serum react with antigen no. 2 without reacting fully with antigen no. 1 (or no. 3). Marked differences between the reactions with antigens nos. 1 and 4 are, however, often seen. When such difference is qualitative (positive with one and negative with the other) the test should be repeated with (i) half the dose of the serum, and (ii) half the dose of the antigen. An increased reaction in either case would be a paradoxical reaction. The one with the decreased serum would be accepted as stronger than before inasmuch as an excess of the serum was interfering with its full development in the first instance. The one with the decreased antigen would still be doubtful

inasmuch as a relative deficiency in the serum (deficiency of the reagin, in quantity or quality) was interfering with its full development in the first instance. Exclusion of the paradoxical reaction is also necessary when known facts do not agree with the reaction and are thus anomalous in another sense.

An anomalous reaction in the case of the cerebrospinal fluid is excluded by halving the antigen only.

Two Uses of Antigen No. 3

Antigen no. 3 is used when antigen no. 1 fails with a cholesterol-fast complement. It is also used as a specially sensitive antigen for clinically known cases. The MHD of the complement is taken from the titration carried out in the presence of the antigen.

Reactions of Bordet's Antigen

This antigen gives the same reaction as antigen no. 1 with a complement of optimal reaction and of low or optimal titre, and a better reaction with a cholesterol-fast complement. When in the adjustment for high titre complement and cholesterol-fast complement the total quantity of the complement for the other antigen is reduced, its reaction may be slightly reduced. Antigen no. 3 gives a higher reaction than Bordet's antigen always. Antigen no. 1 adjusted with respect to cholesterol, for cholesterol-shy complement, varies in its reaction when compared with Bordet's antigen for optimal adjustment, overadjustment and underadjustment; the reaction is the same, lower and higher respectively, without adjustments for the quality of the complement for the other antigen.

Bordet's antigen cannot be improved much by concentration of the extract. A point is soon reached beyond which the reaction decreases. A slight improvement can be brought about by adding to the extract solid cholesterol instead of an alcoholic solution of it which dilutes the extract. (Instead of extract 30 c.c. + 1 per cent cholesterol 20 c.c. take extract 50 c.c. + cholesterol 0.2 gramme.) For an appreciable improvement in the stock, the selection must be strict and must be made from several dozens of extracts.

Bordet's antigen works with complements of all qualities (excepting the very cholesterol-shy complement) without giving any indication of the qualities on which depends the degree of fixation, although the dependence is more marked with other antigens than with Bordet's antigen. This is the main fault in the antigen. It should not be used alone.

Preparation of Titrated Positive Controls

All sera giving +++ reactions are pooled in lots of 25. They provide stronger controls than the pooled sera from cases of florid secondary syphilis mentioned before.

Quantities of Materials

The serum.—A quantity convenient for dilution is 0.5 c.c. 0.4 c.c. and 0.3 c.c. can be tested (will not be a part of the routine in dilution). A quantity under 0.3 is not sufficient for the full test described. The absolute minimum for the minimal number of tubes (one for the control and one for the test proper) is 0.1 c.c., with the standard volume. 'Positive, degree unknown', 'doubtful' or 'negative' will be the results reported. In special cases a full test can be carried out with 0.1 c.c., with a microtechnique.

The quantity of choice is 2 c.c. or more. With this quantity in hand (i) a test can be repeated, (ii) controls for the future can be kept and (iii) a stock can be built of human sera wanted in a serological laboratory for purposes other than the LCF reaction for syphilis. Blood drawn with a 5 c.c. syringe provides enough serum.

The cerebrospinal fluid.—2.75 c.c. will be actually delivered in 7 tubes. A quantity under 3 c.c. will not be sufficient for the full test described. The absolute minimum for the minimal number of tubes (one for the control and two for the test proper) is 1.25 c.c., with a standard volume. 'Positive, degree unknown', 'doubtful' or 'negative' will be the results reported. In special cases a full test can be carried out with 1.1 c.c., with a microtechnique.

The reagents used in 100 tests. (1) *The complement.*—The quantity varies with the titre from 6 c.c. to 24 c.c. The titre varies with the seasons. Occasionally sudden rises and falls distributed over 3 to 4 days due to sudden meteorological changes occur and upset calculation.

(2) *The hæmolytic amboceptor (for 150 c.c. of rbc suspension).*—The quantity varies with the titre from 0.75 c.c. to 0.075 c.c.

(3) *Antigen no. 1.*—3.4 c.c. of the extract is taken. 0.4 c.c. is added for the titration of the complement in the presence of the antigen (total 3.8). No. 3 antigen, if indicated by the titration, is only no. 1 antigen further modified.

(4) *Antigen no. 2.*—1.8 c.c. of the extract is taken.

(5) *Antigen no. 4.*—0.5 c.c. of the extract is taken. 0.1 c.c. is added for the titration of the complement in the presence of the antigen.

(6) *Packed rbc.*—4.5 c.c. will be required.

For smaller number of tests the quantities are proportional, excluding the quantities of the antigen taken for the titration of the complement in their presence.

The complement and rbc suspension are taken in excess of the needs of the 100 tests. They are used in other complement-fixation tests which are linked to the LCF test (*vide infra*).

Special Features of the Technique

There are five such features: (1) Qualities in complement and consequent adjustments in

the antigen-complement system. (2) Standardization of antigens. (3) Use of several antigens. (4) A qualitatively different +++ reaction. (5) Titrated positive controls.

ERRATUM

HETEROZYGOUS Rh TRANSMISSION IN A LARGE FAMILY WITH A CASE OF ERYTHROBLASTOSIS FETALIS

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published in the *I.M.G.*, 82, July 1947, p. 405, column 2, the following lines:

'congenital hæmolytic disease are (Chown, 1944), history of death of the previous child from neonatal jaundice (Diamond and Abelsen, 1945), Rh heterospecificity of the mother and baby (Polayes and Chibaum, 1945), presence of anti-Rh agglutinins in the mother's blood (Ranganathan *et al.*, 1946), their specificity to the baby's red cells (Weiner, 1945) and onset of jaundice on the day of birth and its progressive increase associated with anæmia. The points against are (Chown, 1944), absence of typical clinical features, enlargement of liver and spleen (Diamond and Abelsen, 1945) and absence of'

should be corrected to

'congenital hæmolytic disease are: (1) history of death of the previous child from neonatal jaundice, (2) Rh heterospecificity of the mother and baby, (3) presence of anti-Rh agglutinins in the mother's blood, (4) their specificity to the baby's red cells, and (5) onset of jaundice on the day of birth and its progressive increase associated with anæmia. The points against are: (1) absence of typical clinical features, enlargement of liver and spleen, and (2) absence of'.

A Mirror of Hospital Practice

A CASE OF AMCEBOMA WITH ABSCESS FORMATION FOLLOWED BY INFECTION OF THE DRAINAGE WOUND

By A. INNES COX, O.B.E.

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and

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On the 26th of December 1946, a patient, who had been long resident in a hot and wet part of India, was sent into this hospital by a local practitioner with a tentative diagnosis of chronic appendicular abscess.

At the time of admission, the patient complained of slight pain and discomfort in the right flank and under the ribs in the right side where he was conscious of a tumour and a simple painless diarrhoea unrelated to the intake of food. These definite signs and symptoms of illness had been present for only one week. The previous history was only of bacillary dysentery and colitis during 1945; he had however been

feeling progressively 'off colour' for the past eighteen months. He had undergone treatment by many physicians and was sent to the Nilgiris to try the effect of rest and climate.

The patient, a wiry, highly strung nervous type, did not look ill. The abdomen, soft and easily palpable, showed comparative emptiness in the right iliac fossa, and a massive tumour in the right hypochondrium, that could be palpated through the flank behind like a kidney tumour, but there were no renal symptoms, nor had there been in the history any symptoms of renal disease.

The temperature was 98° and the pulse 100.

Renal tumour, tuberculous disease of the cæcum, chronic intussusception and appendicular abscess came easily to mind.

Renal disease was soon ruled out by a perfect pyelogram and by laboratory tests, so a barium series was taken which showed normality throughout except in the area of the tumour, which appeared to be the cæcum through which the opaque meal shot as it does in the case of tuberculosis of that organ.

Shadows of old calcified tuberculous glands in the abdomen were additional evidence for a diagnosis of tuberculous disease of the cæcum, and the blood count showing leucopænia added weight to the tuberculous theory as against that of appendicular abscess.

However, the possibility of chronic intussusception was kept in mind in spite of the fact that a highly intelligent and sensitive patient declared against ever having suffered a colic.

The case was clearly surgical, the probable diagnosis tuberculous disease of the cæcum and the plan of procedure, a first stage ileotransverse colostomy and a second stage resection.

At operation there was no evidence of tuberculous disease at all, nor indeed of intussusception, so the diseased area was packed off and the para-colic gutter explored by an attempt to mobilize the cæcum.

This presented considerable difficulty owing to the density of adhesions, but when achieved, more than a pint of pus was released from several pockets which, when broken down and explored, left a cavity; the posterior wall of which was the kidney, the anterior wall the massive thickened cæcum, and the superior wall the undersurface of the liver.

It was noticed that the pus was innocent of the typical *B. coli* smell but the condition appeared to be a chronic appendicular abscess, with the difference that there was no vestige of cæcal anatomy and that the walls of the abscess cavities instead of being smoothed out were granular and intensely vascular, so much so that much search for the appendix would have entailed considerable loss of blood. Hence sufficient tissue for biopsy was removed and the abscess cavity drained by a stab wound high in the flank posteriorly.

Resection of the bowel in such a supposedly septic state was not considered; hence after

careful toilet, the abdomen was closed and Dr. Achuton and I agreed to give a course of 6 grains of emetine during convalescence in case we had missed amoebiasis.

During a week's investigation before operation the temperature had been mostly normal, occasionally 99° and the pulse consistently 88 to 102 per minute.

After operation the pulse showed a maximum of 88 per minute and the temperature varied between 100° on the second day and 98.4° on the ninth when the stitches were removed from a cleanly healed wound. The discharge from the drainage stab however remained profuse.

On the 10th day the temperature rose with a rigor, so the stab drainage was explored with sinus forceps, and thereafter the temperature remained normal for nearly two weeks. Then further rigors, temperature and acceleration of the pulse heralded showers of pulmonary emboli. The patient was now seriously ill.

However in the course of 8 days he recovered from this misfortune except for a little blood-tinged sputum and all looked well but for the tumour and a discharge so profuse (being several ounces a day) as to give one cause to realize that the loss was more than could be compensated for by a capricious appetite.

The discharge was sanguineous and gangrenous and on microscopic examination showed nothing pathological as perhaps one should expect in dead tissue, neither had it the appearance of liver pus, and furthermore I had palpated the undersurface of the liver and found no breach on its surface.

Now the drainage wound began to look angry, and from it there extended a gangrenous patch which in a comparatively short time covered an area downwards and forwards equal to that of a large man's hand. The pulse quickened to 120 per minute and the temperature became irregular between 99° and 100°, while the blood-stained drainage discharge increased to such a degree that the condition of the patient deteriorated rapidly and an unhappy ending seemed inevitable.

Throughout the illness frequent stool examinations had been made, all with a negative result, and this, with the 'idea fixe' of appendicular abscess, albeit a peculiar one, somehow stunted originality of thought until a mental picture of something read in the past and half forgotten was recalled. Search found it in the *British Encyclopædia of Medicine*, 1941-42, under Amoebiasis Cutis wherein T. E. Syatt and R. R. Buckoly reported two cases, and were able to collect only 28 published cases. Of these it is stated, 15 recovered and 11 died. Reference to this small paragraph changed the diagnosis immediately and emetine was given with the determination to be bold about it, for without it there seemed no hope at all.

The result after 4 grains was dramatic. The dry black gangrenous skin began to separate like shoe leather, leaving a granulating wound

and a minimum discharge, debridement being unnecessary.

The tumour diminished in size, but remained palpable. The patient has now, in spite of his desperate state, received 9 grains of emetine on consecutive days, a rest for a week, and a further 4 grains. He is up and about, and although he still has his tumour, he is well.

What is to be the ultimate result of this? Will eventual resection or short circuit be necessary? He has never had signs of obstruction nor even ileus after operation. The pathological report of tissue removed for biopsy is, 'No appendicular tissue, specimen shows subacute inflammatory changes with congested blood vessels. No evidence of tuberculous infection'.

Yet clearly this was a case of amoebic granuloma, which is not uncommon. Many such cases have been written up by military surgeons practising in the East during the war. Moreover shortly after arriving at the correct diagnosis the *Indian Medical Gazette* of November 1946 published an article by Dr. D. Govinda Reddy, M.B., and Dr. C. Mohan Rangam on amoebic granuloma of the larger intestine describing six cases, but in none of these was the skin involved, neither can I recall reading of an amoebic granuloma with abscess formation followed by gross skin involvement as the result of drainage.

This case is not only of interest to us, but also gives one of us, Lieut.-Colonel A. I. Cox, an opportunity to correct an error in ætiology of this disease which was described by him in the *I.M.G.*, Vol. LXXVI, no. 11 of November 1941. Therein is described a 'tuberculous' cæcum which was not 'tuberculous' involving the terminal ileum, cæcum and appendix, the whole woody hard and intensely oedematous.

It was suggested then that the disease may be due to lymphogranuloma inguinale and the treatment excision with ileotransverse colostomy.

Lieut.-Colonel A. I. Cox went on to say that the specimens sent to the pathologist for cancer or tubercle proved the cause to be neither, and that unlike cases of tuberculosis or cancer, the resistance of such patients was so good that death was rare, so that verification by autopsy was seldom possible, etc.

What was described at that time must have been amoebic granuloma.

Skin infection is however rare, for why in all the resections that must have been done for this disease, has the skin not suffered? And why in so many liver aspirations does the skin escape? The answer, I presume, is that in the former, the procedure is complete and clean, the skin not being infected, while in the latter, the diagnosis is so obvious that emetine is always given. Yet there are many of us in practice to-day who remember that some 25 to 30 years ago amoebic abscesses were opened and drained, and not infrequently irritated by irrigation. It is regretted that skin section was not taken at

the advancing margin of the disease, so as to put the diagnosis on a sound basis, but to have suggested it would have been tantamount to asking the patient to quit hospital and fore-swear all further treatment.

In this case the amœboma had gone on to an abscess that precluded excision, and drainage with inadequate dosage of emetine resulted in gangrene of the skin, for peri-colic tissue had already been invaded by the amœbæ. Were I to recognize this condition again, I should do the minimum of opening and cleaning out the abscess so gently as to avoid any bleeding from the soft granulation tissue, then close the abdomen without drainage and put the patient on larger doses of emetine.

I should appreciate the views of other readers who may encounter this disease. Especially should I like to know the ultimate fate of such a case, which was little more than one of surgical diagnosis and medical treatment.

A CASE OF DIPHTHERITIC ENCEPHALITIS

By J. W. D. GOODALL, M.D., F.R.C.P. (Edin.)
MAJOR, I.M.S.

THERE are few references to encephalitis due to diphtheria in English medical literature and the condition is considered to be a rare one by Rolleston and Ronaldson (1940). A full description of a case in a child of eighteen months was given by Hall (1932) but apart from this the writer has not found it described except in foreign journals. The following case which occurred in his wards in the Medical College, Calcutta, may therefore be of interest:—

A Bengali Muslim female baby aged one year was admitted on 10th April, 1947. The mother stated that the child had suffered from fever for several days and that she brought her to hospital because she was now having convulsions.

On examination she was found to have a temperature around 99 to 100°F. There was a whitish grey patch on the right tonsil with slight cervical adenitis.

She was inclined to cough and had a running nose. The liver and spleen were not palpable, and the lungs showed no abnormality. The heart was normal except for tachycardia.

She was given 20,000 units of penicillin intrathecally and 20,000 units every 3 hours for 8 days. The throat and nose were also sprayed with penicillin, 1:500 units every 3 hours. Swabs were taken from the throat and nose and the nasal swabs showed the presence of *B. diphtheria* on three occasions between admission and 18th April. The throat swabs were all negative. Lumbar puncture revealed a clear fluid under slight pressure. A few cells all lymphocytes were seen. The protein value was 42 mg. per cent, the sugar 30 mg. per cent, and the chloride 675 mg. per cent. Subsequent estimations made in the course of the disease

showed no appreciable change except that the protein rose to 84 mg. per cent.

Progress.—Within a week of admission after a temporary improvement in the general condition the child began to vomit her food. Her weight began to fall. A fortnight after admission she became drowsy and could be handled without crying or waking. Irregular movements of the left arm and leg were noted but there was no paralysis. The eyes became vacant and staring at times but she could be roused for short periods. She continued to vomit her food.

Some rigidity of the back muscles was noted at this time but there was no definite neck rigidity. The reflexes were brisk. There was no clonus. Babinski's sign was not elicited. The abdominal reflex was absent. The temperature rose to 103°F. and the pulse was 120 to 160 per minute.

It was not till this stage that a diagnosis of encephalitis was made, and she was now given 40,000 units of anti-diphtheritic serum. She was also given a course of 7 days sulphadiazine in place of penicillin which was stopped for a week. No improvement took place. The left upper limb was noted as being weaker than the left on 1st May, and there was a slight degree of wasting of the left deltoid. No cranial nerve involvement was noted. The skull was x-rayed on 26th April, and showed no abnormality. The white cell count, which was done on 11th April, showed 31,000 leucocytes. The differential count was polymorphs 88 per cent, lymphocytes 10 per cent and mononuclears 2 per cent. Further searches in the cerebrospinal fluid revealed no tubercle bacilli.

The subsequent course of the illness was a steady decline accelerated by vomiting and malnutrition. Nasal feeding was resorted to. The patient died on 13th May.

Comment.—The main features of this case were the drowsiness, convulsions and vomiting associated with a high temperature towards the end, and with nasal swabs showing *B. diphtheria*. The patch on the throat cleared up in a few days after admission. No post mortem was held due to parental opposition.

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SOME MISLEADING CASES OF HELMINTHIC INFESTATION

By B. B. RAI, M.B., B.S.

Medical Officer, Training Centre for the Demobilized Personnel, Bareilly, U. P.

Case 1.—Patient named Virendra, aged 3 years, from Nawabgunj, District Bareilly, was brought to the Centre with the following

symptoms. High fever (104°F.), frequency of watery stools, passing every five minutes, delirious and restless. On examination, the patient was thin, wasted, rather of rickety appearance, and pot-bellied. Tongue was coated with fur with angry-looking margins. Fine râles were heard in the lungs.

The abdomen was doughy and tender and there was tympanitis.

Stool did not show the presence of ova or cyst. on microscopical examination. Blood examination was: Total W.B.C. count 12,500 per c.c., polymorphs 65 per cent, lymphos 30 per cent, large monos 1.5 per cent and eosinos 3.5 per cent.

The duration of the disease was eight days. The patient was kept on the lines of anti-typhoid treatment. The diarrhoea, in spite of all dietetic precautions (the patient was kept on milk whey and *mussami* juice), medicinal aid persisted. Ice cap had to be applied for high fever and delirium, and plaster was applied for relieving the abdominal distress. After a week's confusion and anxiety, it was rather a surprise to find that the patient had passed a roundworm. He continued having hyperpyrexia, uneasiness and diarrhoea for the day, but in the evening the temperature dropped to normal, diarrhoea stopped and general condition improved.

Case 2.—Roop Kishore, aged 6 years, was brought with severe and distressing cough, high fever and delirium. On examination, the lungs showed the signs of acute bronchitis. Toxæmia was pretty high. The patient was a normal healthy boy otherwise. The child was kept on cibazol and glucose solution with plenty of water and fruit juice. Suddenly on the third day he passed three worms (*Ascaris*). Later on he was given santonin and he passed three more worms.

Case 3.—Bhagwan Das, aged 38 years, came to me in the evening at about 9 p.m. with severe abdominal colic. He was prescribed hot fomentations, and carminative mixture with bromides was given internally. He passed a restless night with bilious vomiting, which gave him relief for some time. On examination, there was nothing particular to give cause for anxiety. In the morning the patient vomited two big round worms.

Case 4.—Munno, aged 9 years, a total vegetarian and from an orthodox family, was brought with the complaint of blood in stools, the blood being scarlet red in colour and about a teaspoonful in quantity. On rectal examination an ulcer just an inch above the anus was found. After a week the patient developed an acute type of dysentery with tenesmus and fever. He was an average thin young child. The stool examination showed heavy infestation with tapeworms.

Comment.—From the cases referred to above and from general observation, it has been found that worm infestation, with roundworm in the first place and tapeworm in the second, is very common in Rohilkhand. The infestation is responsible for a very high

mortality (the patients mostly die before they are actually diagnosed in an ordinary practice, where the routine clinical examination is not possible) and the cases are diagnosed accidentally during the later stages of an acute illness. In many a case stool examination does not reveal ova or worms. The blood picture often is not of much help. Eosinophilia is not present invariably. It is a feature of the later stages.

Usually the signs and symptoms presented by the patients in the clinic are very misleading, specially when laboratory aid is not at command. The infestation is mostly found in children aged 2 to 13 years and more commonly in Mohammedan children.

SPONTANEOUS RUPTURE OF THE SPLEEN FOLLOWING AN ATTACK OF MALARIA : ITS CAUSES

By N. W. BILIANGADY, B.M.S.

*Superintendent, Beggars' Home for Males, Visapur,
Dist. Ahmednagar*

W. A., age 48 years, Northern Indian, was admitted to the Hospital of the Home on 29th March, 1947, for high fever with rigors the evening before. The spleen was not palpable. There was an epidemic of malaria here since December of last year. He was put on mepacrine one tablet three times a day.

In spite of mepacrine he continued to have the regular fever preceded by rigors. The temperature used to shoot up to 105°F. On the 30th, the spleen was palpable on deep inspiration. Next day it could be more easily palpated. On the 1st and 2nd of April it was readily felt a finger or two below the costal margin.

After three days of mepacrine treatment with no abatement of fever, five grains of quinine were given intravenously, mepacrine being continued. Even with quinine on the 1st of April the fever did not spare him. But next morning he was looking bright and feeling better. He relished his food and took ample rest throughout the afternoon, as he had no fever. That evening he was discharged, ordered to take a week's rest in his dormitory and his daily tablet of mepacrine for a fortnight from the outdoor.

On the third morning he was brought back to the dispensary for diarrhoea. It is said that he walked from his dormitory to the dispensary. The S.M.S. officer was sent for. Within five minutes the doctor hurried down, but before he could attend to him, the patient died. On enquiry it was found that he had passed a few watery motions in bed early in the morning and a few more after daybreak when his condition was taken notice of and he was carried to the hospital. After the post-mortem examination thorough investigations were made as to whether he had fallen or been injured while attempting to go to the latrine, or while being placed on

the examination table, or whether some of his companions nearby getting annoyed had hit him. It was learnt that nobody had worried him in spite of his creating nuisance and that he was carried to the hospital with all gentleness.

Post-mortem examination

The body was pale looking and the mouth and eyes were dry.

The thorax was opened only to find both lungs collapsed and the heart contracted without any blood in it.

As the abdomen was opened serous and sanguineous fluid flowed out. The abdomen was full of blood and clots. The spleen immediately attracted our attention, and its gastric surface was found covered with clots which came along with it when it was removed.

An irregular rent, running zigzag from the lower end of the hilum, was noticed after clearing the organ. It was 2 cm. long and half cm. broad and deep. A firm clot was covering it. As it was removed the rent became wider and deeper, exposing more of the splenic pulp. At the hilar end the lowest branch of the splenic artery with its corresponding vein was exposed and the peritoneal covering over it was also torn for 1½ cm. Immediately above the rent there was an oval area of 3 cm. long, a little puckered and depressed and presenting a yellow coloured web-like appearance. The gland was more friable than usual. Its surface looked as if there was a measly rash over it. The surface was shining. No other abnormality was seen. The dimensions of the spleen were 22 cm. in length, 14 cm. in breadth and 6 to 8 cm. in thickness. It was not weighed. The lower border was only one finger below the costal margin. A slice was removed from about the rent and was sent for pathological examination to ascertain the exact nature of the lesion.

Professor P. V. Gharpure, M.D., of the Grant Medical College, Bombay, has been kind enough to examine the specimen for us, and give his findings and opinion on it thus: 'Malarial spleen. Parasitized red blood cells seen in section. The rupture is spontaneous'.

The other organs were, as expected, pale looking besides showing a grey tinge about them.

Comments

The splenic tumour, whatever its nature, is notorious as the sword of Democles, ever hanging over the possessor, on account of its liability to rupture for little or no reason. But it is the large chronically enlarged spleens that have earned this bad name. Acutely enlarged organs may as well give way as in this case, though this mishap may be rare.

It is usually said that the cause of the rupture may not be obvious. Equally, obviously it seems that it is not sought for assiduously. In this case I believe that the diarrhoea led to the rupture. It may not be out of place if I draw attention to the severity of the diarrhoea that

some inmates suffer on account of their irremovably deep-rooted dirty habits. One of them even died after passing only two copious watery stools before anything could be done to him. This man was one of these dirty people. As seen from the notes on 2nd April, he evidently must have eaten more than he could possibly assimilate; thereby he might have had his death-dealing diarrhoea. On account of the forcible movements of the colon near about the splenic flexure, a certain amount of pull must have been exerted on the spleen through splenic end of the mesocolon. In diarrhoea movements must occur frequently, widely, and in rapid succession. The splenic flexure is one of the junctions of mobile and fixed parts of the colon. The mesocolon here rapidly becomes narrow and limits movement, thus making tugs due to movements all the more forcible. I think, therefore, that these repeated and strong pulls tore the spleen at the junction of an old fibrosed area with the rest of it. The spleen in that fresh condition was so friable that even gentle pressure by two fingers could tear the capsule. Hence it is not difficult to understand the fatal outcome in this case.

Besides, the patient probably got nervous on account of the diarrhoea. The nervousness might have induced the gland to contract. The contraction may, again, be due to a reduction in the blood volume caused by rapid evacuations. Normal areas contract and fibrosed ones do not. Such uneven contractions may lead to rupture, as a hot piece of glass cracks by the mere touch of a drop of water. The spleen may be said to be hot and brittle in conditions like malaria in the sense that it is more fragile than otherwise with distended and thinned out capsule under tension.

Should this explanation of mine be acceptable, some of the customary lines of treatment will have to be revised. The routine administration of an aperient for every case of malaria would become questionable as it is already with regard to several other conditions, especially surgical ones. And this caution may have to be exercised for a long time after the attack. The recently advised adrenaline therapy for reducing the size of the spleen will have to be viewed suspiciously if all causes that make the spleen contract are to be taken seriously into account.

It would be advisable to keep the patient in bed and watch him, just as for cases of injuries to the head. During and after a febrile attack, any sudden collapse shall have to be seen by a surgeon in good time, for such a spleen bursting spells rapid death in a few minutes. Only recently I witnessed a case of ruptured spleen dying within hardly 10 minutes of the receipt of a fist blow not very seriously inflicted over the splenic region. Immediate operation may have to be proceeded with merely on the suspicion that such a thing is possible.

My experience of malaria, in this place notorious for it, is that quinine, intravenously,

very quickly controls the disease, more quickly than do mepaerine and quinine itself by mouth or intramuscularly. It is not dangerous if old men, pregnant women and cardiac cases are avoided. If well diluted and slowly injected, it is harmless to the vein, and for the same reason, absolutely painless. Popularization of intravenous use of quinine would go a long way in preventing such catastrophies.

TREATMENT OF SCABIES WITH D.D.T.

By (Miss) D. HARI, M.B., B.S., L.M. (Dub.)
Zenana Medical Officer, Rajkot

In the outdoor department of this hospital several women bring children covered with lesions of scabies not only on hands and feet but all over the body.

In April, a Mohammedan lady came with two girls; all three had scabies. The itching was so bad, she said, that they could not sleep. She asked for an instantaneous cure.

Scabies being a parasitic infection I tried D.D.T.

I just dipped a swab stick in D.D.T. and touched every sore and every yellow point with it. Then I gave them potassium permanganate (gr. 2) and advised them to go home and take a hot bath with the lotion.

Next day they all turned up quite cured, looking well and clean.

After this I tried this on my servant's children who were suffering for a long time with scabies with amazing results. Ever since then I used D.D.T. for scabies and it is our routine treatment now.

Therapeutic Notes

NOTES ON SOME REMEDIES

XII. ANTIMONY AND ITS DERIVATIVES (Part III)

By R. N. CHAUDHURI, M.B. (Cal.), M.R.C.P. (Edin.),
T.D.D. (Wales), F.S.M.F.

(From the Department of Tropical Medicine, School of Tropical Medicine, Calcutta)

II. SCHISTOSOMIASIS

THREE distinct, but closely allied, diseases are produced by certain nematodes of the family Schistosomidae which gain entrance into the human body through the skin and inhabit the venous system, causing lesions in the bladder, intestine or liver.

1. *Urinary schistosomiasis*.—This is due to *S. haematobium*, the eggs of which, being

deposited in the mucous membrane of the bladder, give rise to hæmaturia and cystitis, and occasionally when deposited in the rectum, to mucæo-sanguineous discharges from the bowel. It is very common in Egypt and many other parts of Africa. A number of cases were observed among African troops stationed in Assam during the last war.

2. *Intestinal schistosomiasis*.—This is due to *S. mansoni* and affects the rectum and sigmoid and to a less extent the liver. It gives rise to diarrhoea or dysentery-like symptoms and may be complicated by cirrhosis of the liver and enlargement of the spleen known as Egyptian splenomegaly. It is widely distributed in Africa and may co-exist with the first variety. It is found in South America also.

3. *Asiatic schistosomiasis*.—This occurs in Eastern Asia. It resembles the intestinal variety in the earlier stages but has a greater tendency to produce enlargement of the spleen and cirrhotic changes in the liver.

Treatment

1. *Tartar emetic*.—It is given as in kala-azar but it is customary to start with $\frac{1}{2}$ grain dissolved in 6 c.c. of distilled water and gradually increase the amount by $\frac{1}{2}$ grain till the maximum dose of 2 to $2\frac{1}{2}$ (in children 1 grain) is reached. A total of 25 to 30 grains in adults and 10 grains in children spread over 4 to 6 weeks is usually sufficient. *S. mansoni* is more difficult to extirpate and requires larger doses up to a total of 50 grains.

The effects of the treatment in uncomplicated cases are striking. After a few injections the vesical pain and the scalding sensation disappear and the urine clears up, and in the early stages of *S. mansoni* and *S. japonicum* the blood in the faeces decreases and the toxic symptoms improve. The ova become shrunken, shrivelled and blackish and at the end of the third week all of them are usually dead. In severe cases dead ova may be passed intermittently for weeks and months after the parent worms are dead. The percentage of cure is about 90.

2. *Anthiomaline*.—This is more efficacious than tartar emetic and can be given intravenously and intramuscularly. It is supplied in 2 c.c. ampoules of a 6 per cent solution. Injection is given every second or third day, commencing with 1.5 c.c. and increasing by 1 c.c. until the average adult dose of 4 c.c. is reached. This dose is then continued until a total of 65 c.c. has been given. The dose for a child of 12 is half that of an adult.

3. *Neoantimosan (Fouadin)*.—This drug which is used in Egypt is put up in 6.3 per cent solution in ampoules and is given intramuscularly. The dosage recommended is: first day 1.5 c.c.; second 3.5 c.c.; third 5 c.c.; thereafter the last dose is continued on alternate days up to the 15th day. It gives a greater cure rate than

tartar emetic (about 97 per cent) but sometimes produces severe sickness.

The *pentavalent compounds* do not seem to be so efficacious in schistosomiasis as the drugs mentioned above. As in kala-azar, it is necessary to give the full course of treatment, otherwise all the parasites and the eggs may not be killed and there will be relapses. Relapses are also likely to occur if the treatment is interrupted for a week or longer. When they do occur, the treatment should be repeated. Some cases resist normal treatment; this is said to occur in persons whose excretion of the drug is exceptionally quick, so that it does not get a chance to act. The specific therapy is applicable to all three forms of schistosomiasis, but it should be remembered that antimony attacks only the living parasites and has no effect on the gross changes that occur in the advanced stages of the disease. These may be in the form of urinary fistula or stone in the bladder in the urinary form and troublesome rectal growths in the intestinal form. These are however amenable to surgical treatment. Removal of the spleen is called for where splenomegaly is a marked feature, but little can be done for the hepatic cirrhosis which occurs in the late stage of the Far Eastern variety.

III. TRYPANOSOMIASIS

The chief remedies for this condition are Antrypol (Bayer 205), Pentamidine (M.&B. 800) and Tryparsamide. Antimony has the disadvantage of being quickly excreted from the body and cannot be relied alone for a disease which is very chronic in nature and liable to relapse even after long absence of the parasites from the peripheral blood. But it is still used for its synergic effect. Moreover, the trypanosomes have a tendency to become drug-fast, and when once a relapse has taken place after an initial course of treatment with antrypol or tryparsamide, it is unwise to persist with larger doses, but a change should be made to remedies of different nature. Thus, antimony may be given to resistant cases or alternately with other drugs to accentuate their effects. Tartar emetic or antihomaline may be used as already indicated.

IV. LYMPHOGRANULOMA INGUINALE (CLIMATIC BUBO)

This virus infection which is acquired by sexual intercourse causes in the males inflammation of the inguinal glands and in the females pelvic lymphadenitis producing inflammatory lesions of the rectum. The disorganization of the lymphatic structures may lead to elephantiasis of the genitalia.

Both antihomaline and tartar emetic have been used but in smaller doses—the former with the initial dose of 0.5 c.c. increased by 0.5 c.c. up to 2 c.c., total of 10 or more injections; and the latter requiring 8 to 15 injections of 5 to 10 c.c.

of a 1 per cent solution. To be successful they must be given before the glands begin to suppurate.

The sulphonamides have a more definite value in this disease (vide *Indian Medical Gazette*, Vol. 82, No. 3, March 1947, p. 132). In presence of complications like rectal stricture there may be need for local measures such as dilatation, etc.

The value of treatment by drugs is, according to Manson-Bahr, enhanced by protein-shock therapy especially when suppuration has commenced. T.A.B. vaccine is employed, starting with 50 millions given intravenously and gradually increasing to 200 to 300 millions, injections being given every third day. The gland should be aspirated if there is suppuration. After 2 or 3 injections the buboes usually begin to dry up.

V. GRANULOMA VENEREUM

This chronic disease is of venereal origin and usually involves the genitals or the adjacent parts, being characterized by ulceration with a spreading granulation surface while at the same time tending towards partial cicatrization. The lymphatic glands are usually not affected. The causative organism is believed to be the Donovan body, gram-negative capsulated organism occurring within large mononuclear cells in the scrapings from the active borders of the lesions.

Of the many methods of treatment antimony probably gives the best results. Ten or twelve injections of 1 per cent solution of tartar emetic, beginning with 5 c.c. and increasing to 10 c.c., may clear up the lesions. Neostibosan and foudain are considered more efficacious. The early cases (i.e. within the first six months) respond quickly to antimony, but the progressive ones require more than one course of treatment and a few remain resistant. The treatment may be combined with x-rays and with protein-shock therapy.

Manson-Bahr advises daily dressing of the open granulations with a 1 per cent tartar emetic ointment, leaving it on the sore for 2 hours and then washing it off and applying boracic ointment. Rapid healing is sometimes ensured when podophyllin is used locally. After first cleaning the lesions with hydrogen peroxide, 20 per cent of the resin in olive or castor oil is applied twice daily, preceded by the application of a local anaesthetic to prevent any pain. When the exuberant granulations disappear, podophyllin is discontinued and scarlet-red ointment is applied to stimulate epithelization. Another local application is a sterilized suspension of zinc peroxide in distilled water, its activity depending on the liberation of oxygen. It is rubbed into the sore.

The sulphonamides are of doubtful value and penicillin has no direct therapeutic effect but may be valuable in cleaning up the secondary infection and allowing the specific treatment with antimony to be more effective.

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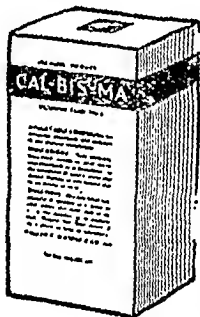
certain beef preparations. One of the substances investigated was Bovril.

As a result of these experiments (described in detail in the *British Medical Journal* of August 28th, 1937) Bovril emerged as 'the most effective stimulant.' Briefly, it was proved that Bovril increased the supply of gastric juices where there was a deficiency and restored it to normal. It is an accepted medical fact that people of sedentary habits generally suffer from a lowering of the essential gastric activity; Bovril rectifies this and, by facilitating the digestion of proteins, enables full nourishment to be gained.

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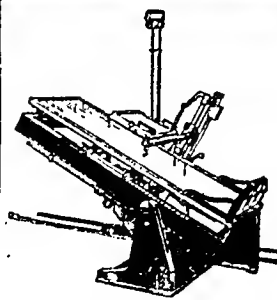
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Indian Medical Gazette

SEPTEMBER

PLANNED PARENTHOOD

THIS expression or FAMILY PLANNING is an euphemism for birth control in the West. Additions to the family occur according to a plan based on the financial status of the parents mostly and on their health occasionally. In the East generally and in India particularly these expressions also find application but denote quite a different state of affairs. The parenthood here is planned by the grand-parents of the additions. They arrange marriages between boys and girls usually before puberty. Not long ago most of such marriages actually were entered into (= solemnized) also long before puberty. In a specially surveyed area in Bengal the average girl-wife to-day cohabits at 12.7 and presents her addition to the family at 16 (Lal and Seal, 1946).

The girl, it is argued, is not only married to the boy but also adopted into the family at a tender and an impressionable age. The traditions of the family are thus handed down not only by the father to the son but also by the mother-in-law to the daughter-in-law. The result is a portrait gallery of long lines of ancestors always present before the mental eye. The ancestors provide the precept and the model. The future to an Easterner is only the past entering through another door. On such a basis rests the foundation of the Eastern culture which, with all its faults, teaches how to live and let live, as opposed to the Western culture which only teaches how to live.

While China and India with their ancient civilization remain what they were before Greece and Rome rose and fell, before Christianity was born, 'within historical times at least three civilizations have risen and fallen in the West. Within comparatively recent times great powers have sunk into obscurity and a nation born only two hundred years ago dominates the world to-day' (Parkes, 1946). So much for the bright side of the culture which teaches how to live and let live. There is a dark side also.

Concentration on the past and the future ignores the present in spite of Confucius. The joy of living is replaced by rituals. Even sex becomes a duty. A son must marry to beget a son. A daughter must be married to give someone a son. A characteristic state of inertia, containing amongst other ingredients an overwhelmingly large percentage of resignation and boredom, overpowers the nations whose masses become hewers of wood and drawers of water, to adventurers of their own land or from abroad. Thus has lived Asia almost from the dawn of Asian civilization. Life at any cost even at the cost of human pride and self

respect. Even under congenial circumstances the life is reduced to the minimum, leading to joint families and lowering of the standard of living. The masses of Asia differ from those of Europe. They specialize in organizing poverty and equalizing misery.

The lower standard of living and enforced duty to sex have given rise to a population pressure which has been enhanced in recent times by modern sanitation. The higher the population pressure the lower the standard of living, the lower the standard of living the higher the population pressure: so runs the vicious circle.

Westerners who are also feeling the population pressure are finding it difficult to reduce it or to reduce it satisfactorily by planning parenthood. The planning is undertaken by the population with a high intelligence quotient while the one with a low I.Q. breeds unchecked. The result: a general lowering of I.Q. for certain. 'We are told that if the present drift is maintained it will result in a drop of nearly two points in the Binet I.Q. between the average of one generation and that of the next. If this is true and continues we shall see human mentality reduced below that of the apes before we have recovered from the last war' (Notes and Comments, 1947). The planning may not reduce the pressure appreciably and is definitely dysgenic in its operation.

From America comes the same tale of woe: 'It is shown that college graduates and high-school graduates had underreplaced themselves by 45 per cent and 21 per cent, respectively, while those with only one to four years of grade school had overreplaced themselves by 95 per cent. Also, it was found that the lowest economic third of our families have overreplaced by 76 per cent, while the highest economic third has underreplaced by 19 per cent' (Editorial, 1947).

The giving up of our system of planning parenthood, on the other hand, is bound to be fruitful. It will decrease the population pressure and increase our I.Q. at the same time. The population which plans the most contributes to the quotient the least. And it may be possible to persuade it to give up the planning. The masses are at present buoyed up by the spirit of independence and will do many things for their leaders, even if they refuse to turn the other cheek in obedience to vespers exhortations, at times.

The usual methods of the Western type of planning will not even work universally in our country, because of poverty, lack of privacy, and tropical deterioration in the usual material employed. Even in the West they do not appear to be crowned with unqualified success (Editorial, 1946). The 'safe period' may be studied and employed. A few years ago this method fell into disfavour. But recently it has found favour again with the authorities on the subject. (Hyman, 1947). Even if it fails in individual cases it will succeed on the whole and

serve its purpose fully. If necessary, the law should be amended to legalize measures which though not unethical to the majority of the population are illegal because of old European prejudices. (The British Government Committee on Abortion, 1947). Such an aid to the handicapped woman has been rendered elsewhere for many years now (Haire, 1947) without any appreciable injury to the physique, prestige or pride. The unwanted children passing through the stage of problem children give rise to problem families which in a nation's life, in peace time, are not less dangerous than fifth columnists during a war. Not a small fraction of a large section of our population consists of unwanted children born of boredom alone.

Removal of the boredom itself, by providing healthy recreation and sports, will limit the population directly. The appreciation of leisure is inseparable from the appreciation of the good things of life. The latter appreciation convinces one of the futility of lives lived at low levels, raises the standard of living and thus limits the population indirectly. That happiness in this world does not interfere much with the enjoyment of the next, could also be a part of the plan and be made plain to the masses now who have become radio conscious. They will listen to suitably selected folk-lore rich in wit, humour and pathos. For the older generation a mixture with theocracy may be necessary. There is no harm in such a mixture. It will not be required for long. Even if it is one does not mind: England is theocratic and so is one of the twins born of the British Empire.

At this juncture all things are possible and we see a great future before the nation. Even the unfortunate wave of fratricide shows that the worm at last has turned. The stupidity of killing one's neighbour, of one's own race, who speaks the same language, sings the same songs and eats the same food, for differences which do not concern this life at all, will soon be realized and by then the worm will no longer be a prone and helpless dweller in the slimy ruts of ages in which Asia abounds. Cases of Asian Torpor are recovering by crisis and passing through a phase of mental symptoms. All is going to be well with them soon.

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Special Article

TRANSMISSION OF KALA-AZAR IN INDIA. THE CASE AGAINST THE SANDFLY. A REJOINDER

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A SPECIAL article has recently appeared in the *Indian Medical Gazette* (Shortt, 1946) which purports to be a reply to our paper on the transmission of kala-azar published in the issue of October 1944 (Malone and Brooks, 1944).

If this reply is the 'complete refutation' of our assertions referred to by the writer in his paper read at the meeting of the Royal Society of Tropical Medicine held on 17th May, 1945, it has signally failed in its purpose.

Before replying to his criticisms the case may briefly be restated:—

Swaminath, Shortt and Anderson (1942) succeeded in transmitting kala-azar to human volunteers by the bites of *P. argentipes* bred and reared under the following experimental conditions; laboratory-bred flies were fed on suitable kala-azar patients; they were reared in globular glass chimneys at a temperature of about 28°C. and fed on raisin juice; their life was prolonged to 10 days or longer and during this time the flagellates multiplied and extended into the pharynx and buccal cavity, a considerable proportion of flies becoming 'blocked'. They were then fed on human volunteers who later developed kala-azar.

This experiment, it is claimed, provides the final proof that *P. argentipes* is the true vector of kala-azar in nature.

Our contention was that the experiment had been carried out under conditions which do not obtain in nature; that the prolonged life of the flies, the pullulation of the flagellates into the pharynx and buccal cavity, and their 'virulence' were all due to the particular conditions under which the flies were bred, reared and fed in the laboratory; and, consequently, the final proof of transmission by the sandfly in nature is still lacking. We supported our contention with arguments based on:—

1. Our present knowledge of the bionomics of *P. argentipes* in nature.

2. Certain epidemiological observations which, in our opinion, could not be reconciled with the theory of transmission by a biting insect.

In our paper we stated that there is no proof that in nature the sandfly lives for longer than 6 days, nor that it takes more than one blood

meal, nor that it ever indulges in raisin juice or plant juices of any other kind.

Since these phenomena appear to be essential for the experimental transmission of kala-azar by sandflies, the supporters of the sandfly transmission theory must show, in order to prove their case, that our statements are incorrect or demonstrate that the experimental conditions under which successful transmission became possible were similar in all essentials to those obtaining in nature.

Thus Shortt attempts to show—

1. That the sandflies live for 10 days or longer in nature, and therefore must have fed more than once.

2. That there is presumptive evidence that they feed on plant juices in nature, since this is a normal procedure in the rearing of laboratory-bred sandflies and mosquitoes.

3. That in other respects, especially with regard to temperature and humidity, the experimental conditions were similar to those obtaining in nature.

4. That, as a corollary, a duration of life of 10 days or longer, the indulgence in a second blood meal and the ability to infect which occurred under those conditions must also occur in nature.

We consider this to be a fair statement of the case and may now proceed to deal with the points raised in Shortt's paper, his criticisms and objections.

Duration of life of P. argentipes

In his attempt to show that sandflies live for 10 days or longer in nature the writer criticizes our interpretation of the results of experiments carried out by Smith *et al.* (1936) in which flies were marked, released and then searched for on successive days after release. He states: 'In their comments it has suited the authors to ignore the previous experiments of Smith *et al.*, where, out of a much smaller number of flies (667) released, recoveries of marked flies were made up to the fifteenth day. Our knowledge of the physiology of the sandfly makes it certain that such flies must have fed a minimum of three times to live for so long a period'.

This statement is incorrect, it is misleading, and it begs the question.

So far from ignoring Smith's experiment we made full reference to these 667 flies, included the author's table showing daily recoveries of marked flies and commented on the possible

fallacy in one of the methods of identification (*viz.*, the removal of one middle leg in so delicate an insect) used in this experiment which, we suggested, led to its being abandoned in later experiments.

To say that in this experiment recoveries of marked flies were made up to the 15th day is misleading. Flies were recovered on the 3rd, 4th and 7th days and not again until the 15th day: none was recovered on the 1st, 2nd, 5th and 6th days.

It is clear that little reliance should be placed on this experiment, on account of one of the methods of identification employed, the relatively small number of flies released, the low recovery rate (1.4 per cent) and the irregularity of the catches. In the later series (after a reliable method of identification had been introduced) 3,271 marked flies were released: the recovery rate was 3.6 per cent: catches were made (*in decreasing numbers*) on every day from the 1st to the 6th and *not afterwards*.

We rightly considered that much more reliance should be placed on the latter series of experiments than on the former.

Shortt assumes that the two flies caught on the 15th day in this obviously imperfect experiment were genuine 'marked' flies, and on this assumption (which requires proof) remarks that they 'must have fed a minimum of three times to live for so long a period'. This is simply begging the question and should, on no account, be taken as evidence that the sandfly feeds on more than one occasion in nature.

This type of experiment was continued in 1937, 1938 and 1940 and there is no record of a single marked fly having been recovered after the 5th day following release (Report of the Scientific Advisory Board, Indian Research Fund Association, 1937, 1938 and 1940). The figures for daily recoveries of marked flies are not given in the 1937 and 1938 reports, but in the report for 1940 it is stated: 'Of 810 flies marked and released 25 were recovered, the majority were captured on the 1st and 2nd days after release and only one was found on the 5th day. These results are very similar to those obtained in 1934. . . .'

It may be of interest to the reader to compare the results of the three experiments referred to above.

This disposes of the claim that there is evidence to prove that the flies live for 10 days or longer in nature.

Experiment	Number of marked flies released	Number of marked flies recovered daily										Total	Percentage of recoveries
		1st	2nd	3rd	4th	5th	6th	7th	...	15th			
1	667			1	2			4	..	2	9	1.4	
2	3,271	79	18	9	7	2	3	..	..	..	118	3.6
3	810			24		1	..	..	..	..	25	3.1

(The majority on the 1st and 2nd days)

Further on in the section dealing with the duration of life and feeding habits of *P. argentipes* the writer states:—

'In quoting the opinion of Shortt *et al.* (1932) that in performing the act of fertilization the males die, having paid their full debt to nature, they go on to say "It is probable that in ovipositing the female also pays her full debt to nature". In other words they imply that the female is intended to lay eggs once and then die'.

In his quotation from our article, the writer has omitted the concluding part of our sentence, which was: '*as suggested by the work of Christophers et al. (1926) quoted above* (italicized now for the benefit of the careless reader).

It is obvious that we were not 'quoting the opinion of Shortt *et al.* (1932)' but referring to two observations made by Christophers *et al.* (1926), *viz.*, that the flies invariably died immediately after ovipositing and that caught gravid flies never took a second meal. We suggested nothing more than that, *in nature*, the female sandfly as well as the male is short-lived and that once fertilized she does not require a second meal. The implication here is that the sandfly, *in nature*, lays only one batch of eggs. We had no intention of casting reflections on the egg-laying capacity of the writer's laboratory flies, but we must protest against the general tendency to argue from laboratory flies to wild flies as if the habits and behaviour of the former are necessarily identical with those of the latter.

He then goes on to make the following remarks (we may be pardoned for quoting them in full): 'If the authors had even a slight knowledge of the anatomy of the female sandfly they would know that each possessed an organ called a spermatheca, which on the act of fertilization, soon after the emergence of the fly, collects in it a large store of spermatozoa *intended to fertilize future batches of eggs* (author's italics). Were the sandfly intended to lay only one batch surely nature would not have gone to the trouble of supplying it with a special organ for the storage of spermatozoa which would never be used.'

Nature's intentions are not always so readily discernible. There are some insects (among the locusts, for instance) which possess a spermatheca and yet lay only one batch of eggs: others (among the moths, for example) which possess a spermatheca and yet live for a day or two only: and finally, there are species of *Drosophila* which possess a spermatheca, lay a single batch of eggs and die immediately after ovipositing. This is exactly what Christophers *et al.* (1926) and Napier and Smith (1926) observed in the case of *P. argentipes*.

The little lecture on Entomology, quoted above, with its almost pathetic appeal to teleology would have delighted the nineteenth century theologian: it will hardly satisfy the student of to-day.

The fallacy in the argument (contained in the words italicized by the present author) is obvious, yet Shortt would have his readers believe that 'this one fact would seem completely to demolish the structure of their argument'.

Feeding habits of P. argentipes

Two important considerations to be discussed in relation to the transmission of kala-azar are: (1) Do the sandflies take more than one blood meal in nature? and (2) do they feed on plant juices in their natural environment?

With regard to the first question. It was the opinion of Napier and Smith (1926) that the flies do not take more than one blood meal in nature and there is no evidence at the present time that they do. The onus of proof does not lie upon us and since Shortt has not attempted to refute our statement the question need not be discussed further. The argument that they can be induced to take more than one blood meal under certain laboratory conditions, and may therefore be presumed to do so in nature, will be dealt with later.

With regard to the second question. There is no evidence that the flies feed on plant juices in nature. I agree with the writer that 'it would be difficult to prove that flies never feed on plant juices under natural conditions', but here again the onus of proving that they do so does not lie on us. On the other hand there is presumptive evidence that they do not. (1) Attempts to capture flies in areas, not in the vicinity of houses or cattle sheds, where there is vegetation have been singularly unsuccessful. (2) There are some endemic areas of kala-azar where plant juices would appear to be well-nigh inaccessible to *P. argentipes*. Thus, Christophers (1926) notes that in parts of Madras where kala-azar is endemic 'so closely built are some of the houses that over considerable areas there are no spaces other than small paved yards and the street'. 'At Kayalpatnam the disease occurs in small solidly-built Mohammedan houses associated with a soil of pure sea sand'. (3) Shortt himself admits that plant juices are not the normal food, since the ovaries of the fly will not develop in those fed on plant juices from the beginning or subsequent to the first blood meal. This damaging admission will be discussed later.

Notwithstanding this admission he draws an analogy between mosquitoes and sandflies fed on raisins, as follows:

'In keeping mosquitoes for experimental work these methods of feeding on raisins or other plant juices is a normal procedure, but nobody has inferred from this that the mosquito would normally prefer plant juices to blood as its diet, and there seems no reason to suppose in the case of the sandfly any more than in that of the mosquito, that the normal food may not be blood, simply because the insect can be made to feed on plant juices. . . . 'A little more knowledge of the bionomics of insects in general, to say

nothing of *P. argentipes* in particular, would have deterred the authors from developing this argument'.

In the first place the analogy between mosquitoes and sandflies is false. Mosquitoes do not necessarily require a diet of plant juices in order to transmit malaria, while in the case of the sandfly, the diet of raisins appears to be absolutely essential for the transmission of kala-azar. Human transmission experiments carried out before this technique was adopted were entirely unsuccessful, even though the life of the flies had been prolonged by a technique similar in other respects. Thus, 'Eleven human volunteers were fed upon 11,537 times by flies which had previously been fed on kala-azar cases and re-fed two or more times to allow the infection fully to develop. These human experiments were entirely negative in spite of an intensity of feeding much greater than would ever occur in nature' (Shortt, 1946).

In the second place the writer (once more accusing us of lack of knowledge) implies that we believe plant juices to be the normal diet of the flies. Our contention was that *P. argentipes*, in nature, fed solely on blood and there was no proof that it ever fed on plant juices. But here we are not only accused of suggesting that the latter are the normal food but are then condemned for our ignorance in drawing an inference which we did not draw and developing an argument which we never even started.

We still maintain that there is no evidence to show that *P. argentipes* have more than one blood meal or ever feed on plant juices in nature.

Flagellate infections in P. argentipes

In reply to our statement that 'in 20 years of unremitting research not a single *P. argentipes* has ever been recorded with a natural infection of *L. donovani* extending to the pharynx or beyond', the writer states: 'The fallacies in this argument are only too obvious. In the first place the research for *P. argentipes* was by no means unremitting for twenty years, and in fact was only occasionally pursued'.

The exaggeration is admitted—Smith reported one case in 1935—but consider that the writer is guilty of an under-statement in the last words of the above quotation. Perhaps he will agree to the following amendment:—

'In spite of researches during which thousands of flies have been examined, only one *P. argentipes* has been discovered with a natural infection of *L. donovani* extending to the pharynx'.

The writer has unfortunately missed the point of our argument. Obviously, a pharynx infection will be extremely rare when infections of any degree are so rare in nature. The real question to which neither the writer nor anyone else has given a reply is: Why are instances of infection, to any degree, so remarkably few in nature, although thousands of flies have been examined, and when they can so readily be

produced in the laboratory? This is all the more difficult to understand, since the sandfly is a domestic insect and, according to Shortt, 'a certain percentage of infected flies must always be present in houses, harbouring kala-azar cases'.

In this connection we stated that the finding of 7 infected flies out of 226 examined (Shortt *et al.*, 1930) has sometimes led to the assumption that 3 per cent of wild flies caught in kala-azar areas are naturally infected.

Shortt states 'I do not know who makes this assumption but it was certainly not made by the Kala-azar Commission'. I can only say that I have heard this statement made by research workers during discussions on the transmission of kala-azar. And who should blame them? Here are three quotations taken from the published writings of members of the Kala-azar Commission:

1. At the same time it will be evident from the results that a certain percentage of infected flies must *always** be present in houses harbouring kala-azar cases (Shortt *et al.*, 1930).

2. The occurrence in nature of *P. argentipes* infected with *L. donovani*. 'This was demonstrated by the Commission with no special difficulty'. Out of 345 *P. argentipes* caught in kala-azar houses and dissected 8 were found to be infected with *L. donovani*' (Shortt *et al.*, 1932).

3. . . . a large percentage of the flies that feed on an infected person acquire the infection: infected flies have been found *repeatedly in nature** (Napier, 1943).

To-day, however, the writer states, ' . . . in all, the number found infected in nature could probably be counted on the fingers of both hands' (Shortt, 1946).

No further comment is necessary.

The writer then takes exception to our statement that 6 of the 7 flies referred to above were caught in a cattle shed and not in a kala-azar house. He states: 'They further state that six out of the seven flies were not caught as stated by Wenyon (1932) from kala-azar houses but in a cattle shed. Apart from this being an incorrect statement—Wenyon is correct—they again display ignorance of local conditions in Assamese houses. The cattle shed, as often as not, forms part of the house itself, and is normally always immediately adjoining it (our italics). It would be as easy, therefore, for the sandflies after feeding to come to rest in the animal as in the human part of the house'.

The writer's reply is unconvincing: 'The table attached to the original paper (Shortt *et al.*,

* Readers who are interested in this subject are advised to study the original papers as well as the Reports of the Kala-azar Commission. The latter contain abridged editions of the original papers (in addition to previously unpublished reports and reviews) and it sometimes happens that statements in the original, not considered important by the Commission but of value to the critics of the sandfly theory, have been omitted from the reports.

1930) specified ten areas from which *P. argentipes* were caught and examined and in only one instance is a cattle shed expressly mentioned. This is the area from which 6 of the 7 positive flies were captured. Since cattle sheds, as often as not, form part of the house or are normally always adjoining it, why was the cattle shed specifically mentioned at all? Furthermore, the explanation now given by Shortt is strangely at variance with that of Knowles who stated that Hindus suffered less from kala-azar than Mohammedans because Hindus kept cows, and that Lloyd and Napier (1930) had shown that '*P. argentipes* would feed every time by preference on bovine blood'. One wonders why this explanation was not immediately challenged by members of the Commission working in Assam.

This discussion is not simply an attempt to solve a childish riddle—'When is a cattle shed not a cattle shed?' It has an important bearing on the sandfly transmission theory. The writer's display of annoyance at our alleged display of ignorance and his brief but emphatic denial of Wenyon's error are apparently due to the fact that we implied (without expressly stating so) that the six infected flies may not have bitten a kala-azar patient at all, and therefore the flagellates found in them may not have been *Herpetomonas donovani* but some other herpetomonad, morphologically indistinguishable from them. In such an event the arguments used by Wenyon in his criticism of the bed bug transmission theory might be equally applicable here. Wenyon (1932), in writing of the bed bug reported positive by Mrs. Adie, stated: 'There was no evidence that the particular bug had fed upon a kala-azar case, nor that the flagellate observed was actually the kala-azar parasite which cannot be distinguished on morphological grounds from many purely insect flagellates occurring not only in the intestine but also in the body cavity, salivary glands and other organs of insects'.

Having answered Shortt's criticisms this section of the article may be concluded with the following statements:—

Flagellate infections are readily produced in laboratory flies. 'Though the parasite is so scantily found in the peripheral blood, yet with great regularity some 25 per cent of flies fed upon cases develop flagellate infections . . . ' (Christophers, 1926).

Flagellate infections are very rarely found in nature. 'The number of naturally infected *P. argentipes* found up to date is remarkably small and quite out of proportion to the incidence of the disease in endemic areas' (Smith *et al.*, 1941).

No satisfactory explanation for these dissimilar observations has been given by the exponents of the sandfly transmission theory.

Temperature conditions in the laboratory and in nature

One of the earlier devices used by the Kala-azar Commission for prolonging the life of their laboratory flies was segregation of the sexes. This was abandoned for various reasons (Shortt *et al.*, 1926). The writer now claims that this procedure was one of the 'temporary expedients' employed 'when less was known about the bionomics of the fly, and which were discontinued as soon as more natural methods of prolonging the life of the fly were substituted as a result of the study of the conditions under which the fly lived in nature' (Shortt, 1946). It appears, however, that the most important reason for finally abandoning this procedure was the discovery of a new technique which was less tedious and less open to objection. The essence of the new technique was the rigid control of the temperature (28°C. to 1) of the incubator in which the flies were housed. This technique was so successful in prolonging the life of the flies and in stimulating the multiplication of the flagellates that the investigators were eventually led to carry out their first, and unsuccessful, transmission experiments on human volunteers.

It is now claimed that this technique was the outcome of a study of the conditions under which the flies lived in nature: and that it was a deliberate attempt to reproduce the conditions prevailing in nature during the monsoon period, when reproduction of the fly in nature is actively in progress.

This is not in accordance with the published facts (Shortt *et al.*, 1926). The discovery was purely fortuitous and was due to the fact that in a particular part of a particular month of a particular year (the latter part of September 1925) the climatic conditions were such that the temperature of the unregulated incubator in which the flies were housed remained almost constantly between 27°C. and 29°C. Shortt states: ' . . . by September large numbers of bred flies were available for experimental feeding. Towards the latter end of this month the flies began to feed fairly freely under experimental conditions. It was now found that, unlike the conditions which had obtained last year, considerable numbers of flies successfully laid eggs and survived for further feeding. The conditions under which the flies were being kept were similar to those which obtained during our previous work except in one respect' . . . 'the only difference now introduced was purely fortuitous and due to climatic conditions, in that the room temperature now averaged about 28°C. whereas previously flies had been kept at about 26°C. to 27°C. or lower. This uniform temperature of 28°C. was found to be the important factor hitherto absent'.

I have no wish to detract from the acumen of these investigators in developing their new technique of rearing laboratory flies as the result of this chance occurrence, but must

* See footnote on previous page.

protest against the claim now made, that it was the outcome of the study of the flies in nature during the monsoon period. One of our main criticisms has been that little attention has been paid to the study of the flies in nature.

It is extremely unlikely that the uniform temperature of $28^{\circ}\text{C.} \pm 1$ (not ± 2 , as Shortt now states) which was artificially maintained in the incubators would obtain throughout the monsoon period, year after year, even though the temperature of the cracks and crannies in which the flies hide may be more uniform than that of the room.

There is also an unexplained difference between laboratory conditions and natural conditions. The Commission found that: 'The feeding of artificially bred *Phlebotomus argenteipes* can be carried out in Assam between the months of September and April inclusive, if bred flies are available. The period May to August appears to be climatically unsuitable in Assam, and whatever means be taken to encourage it, satisfactory feeding has not been found to be possible'. That is to say: During the months when wild flies are breeding freely in nature, laboratory flies will not feed satisfactorily, but when wild flies are more or less quiescent in nature, laboratory flies begin to wake up!

The alleged similarity between laboratory conditions and natural conditions

It is well known that the factors which govern the duration of life in insects are many and varied. The life of the adult female may be shortened or prolonged by such circumstances as the nature and quantity of the food available, the presence or absence of the correct larval food, variations in temperature and humidity, free or limited association of the sexes, the space allowed for movement and the facilities for mating and egg-laying. Life may be prolonged if the food be deficient in quality or amount, if the proper larval food be absent, and if opportunities for mating are denied. Temperature and humidity, life in a comparatively open space (e.g. an insectarium) or in a closed space (e.g. test tubes or glass globes) and other factors, but little understood, also play their part.

According to Maxwell-Lefroy (1909) 'Abundant food by hastening maturity and the development of the reproductive system may materially shorten the life of an insect; unnutritious food or the lack of food may immensely prolong life either by preventing the immature insect from deriving sufficient nutriment from its food or by checking the development of the reproductive organs, so that life is maintained for long periods until the eggs are formed and egg-laying becomes possible. The absence of the larval food-plant is another factor which prolongs the life of the adult, since the mother insect will remain alive until eggs are laid on the food-plant unless this period is so long as to exhaust her vitality'. Again the

same author states with reference to 'normally very short-lived insects such as many Diptera'.

'For these insects life may be long, but given the optimum temperature, plentiful food, abundant flies hatching out together and a suitable food supply for the young, on which the parent may lay eggs, the period is reduced to the least possible, the egg hatches quickly, the larva quickly lays up food, the transformation is quickly accomplished and the flies quickly find mates'.

Experts in the breeding and rearing of insects have devised various means for prolonging life in order to create conditions suitable for the particular investigation on which they are engaged. Nevertheless, in investigations such as those on kala-azar, where flies bred and reared under certain laboratory conditions prove to be successful transmitting agents, it is the duty of the investigators to show that the laboratory conditions under which the flies were bred and reared were similar in all essentials to the conditions obtaining in nature.

This has not been done by the protagonists of the sandfly transmission theory of kala-azar and indeed so little is known of the bionomics of the sandfly in nature that any claim to similarity in all essentials between laboratory and natural conditions can be nothing more than an assumption. We would go further and suggest that laboratory conditions were created, consciously or unconsciously, by accident or design, which were favourable to the development and multiplication of the parasite but quite unsuitable for the normal life of the sandfly (so far as this is known).

With the technique for breeding and rearing sandflies introduced by Smith in 1924 and modified by Christophers, Shortt and Barraud in 1925, the flies were bred and reared in the presence of larval food consisting of rabbit and goat faeces: the temperature was generally that of the room and the humidity regulated according to experience: the food was blood and the sexes were not segregated. With this technique the females, whether caught or bred in the laboratory, almost invariably died in the act of, or immediately after ovipositing, and very rarely lived longer than 5 days. This is in agreement with the results obtained by Smith when flies were marked, released and searched for on successive days after release. There are some grounds, therefore, for believing that these laboratory conditions were akin to those in nature.

At this stage in the investigations Christophers, Shortt and Barraud stated: 'We have paid considerable attention to making conditions as favourable as possible to the flies and have tried open nets and large and small confined spaces, with various devices and under various conditions of temperature, but without being able to prolong life beyond the periods noted'.

At this time infections of the gut were not infrequently observed but there was little

evidence of the much-to-be-desired 'anterior development' of the flagellates; and so the life of the fly had to be prolonged in order to permit the flagellates to develop fully.

From now onwards the fly is treated more as a laboratory instrument than an organism with a life of its own to lead. New techniques are brought into operation from time to time, only to be discarded as 'better' ones are developed. The female flies are housed in test tubes and isolated from each other: they oviposit on cotton wool plugs in the absence of any larval food, and are induced (or compelled) to have several blood meals. As a 'temporary expedient' they are denied the opportunity of mating. With every successive modification of original technique (each a 'temporary expedient', no doubt) a higher proportion of the flies survive for the desired period, and under these conditions, the flagellates thrive and multiply. Pharynx infections become more frequent and the first buccal cavity infection is announced in November 1925.

Still another modification is introduced, *viz*, rigid control (at $28^{\circ}\text{C.} \pm 1$) of the temperature at which the flies are compelled to live. The efficiency of the latest technique becomes firmly established by May 1926. The Commission is now ready to carry out transmission experiments on human volunteers.

Throughout this period not one of the modifications of the original technique can be claimed to simulate conditions necessary for the normal life of any insect, not even the rigid control of temperature on which such great stress is laid. On the contrary, the devices used for prolonging life are laboratory 'tricks of the trade' which normally have no counterpart in nature.

Notwithstanding this perfect technique the transmission experiments on human volunteers are a complete failure. Large numbers of infected flies are used and enormous numbers of flagellates introduced into the human body. The flagellates refuse to 'do their stuff': for some reason or other they are 'non-infective'.

The Commission now closes down, February 1931, after having been continuously at work in the field since March 1924.

Then suddenly, in 1940, Smith, Halder and Ahmed re-open the question with the announcement of still another technique for rearing sandflies and follow this announcement with a series of papers showing how easy it is to infect

hamsters, and even mice, if this new technique be adopted. What was this new technique? Nothing but the substitution of raisin juice for human blood after the first blood feed.

To Smith must be given the credit for this brain-wave. From a study of his paper (Smith *et al.*, 1940) his reasoning would appear to have been something like this: 'We have tried all sorts of devices for prolonging the life of the flies, most, if not all, of them being unnatural. But one thing has been forgotten. The flies are almost certainly blood-feeders in nature, so let us give them plant juices instead. It worked! Experiments with glucose, honey, bananas and melons were unsuccessful, apples gave promising results, but raisins were just "what the doctor ordered".'

In due course, Swaminath, Shortt and Anderson (1942) proved that Smith was right. All the human volunteers became infected.

It would appear that the change of diet from blood to raisin juice not only altered the 'constitution' of the fly so that the flagellates pululated with speed and vigour but in some mysterious way caused the latter to acquire a high 'virulence'. As a result of this dramatic success we are now asked to believe that *P. argentipes* feeds on plant juices in nature, although there is not a shred of evidence to support this view.

To summarize.—The claim that the conditions under which these laboratory flies were bred and reared were similar in all essentials to those obtaining in nature cannot be sustained. On the contrary they would appear to have been devised solely with the object of encouraging the flagellate to multiply and develop and were quite unsuited to the normal life of the fly. To maintain that absence of larval food, unvarying temperature conditions and a diet which prevents the development of the ovaries are the lot of the sandfly, in nature, is unreasonable if not absurd.

Epidemiological factors

In our article (Malone and Brooks, 1944) we claimed that 'the age incidence, sex incidence and communal nature of the disease, together with other epidemiological observations . . . cannot be reconciled with the theory of transmission by a biting insect'.

The writer makes only a feeble attempt to reply to our arguments. On the question of age incidence 'he is not prepared to argue'; with regard to sex and race incidence he finds the evidence 'too indefinite and involved' so we need not discuss these points further. We repeat, however, that unbiased evidence proves that males are three times as commonly affected with kala-azar as females. Infants in India are very rarely affected. These observations are not what could reasonably be expected if kala-azar were transmitted by a house-dwelling insect. In addition, Indian Christians, Anglo-Indians and Mohammedans are far more

Note.—'Anterior development' here implies forward development towards the mouth parts of the insect taking place to such an extent that it might be reasonably presumed that the insect bite is possibly infective. In referring to our original text in which we stated that the anterior development, as we have seen only, takes place when the life of the fly is artificially prolonged'. Shortt left out the inverted commas in which we had placed the words 'anterior development', thus robbing them of special significance; he then declared that our words were 'a simple mis-statement of fact'.

prone to the disease than Hindus and the explanation that Hindus are protected by cattle can no longer be maintained.

Shortt, however, objects to certain other arguments of ours :—

1. To our statement 'it is generally assumed that the distribution of kala-azar coincides with that of *P. argentipes* in India' he replies : 'The present writer is not aware by whom this assumption is made . . .'

We would refer him to the following authorities :—

(a) Knowles, Napier and Smith (1926). 'It had been pointed out to the senior writer by Major J. A. Sinton, V.C., I.M.S., that the known distribution of the sandfly *Phlebotomus argentipes* in India appeared to coincide* with that of kala-azar'.

(b) In the same article ' . . . in view of Major Sinton's observation with regard to the apparent identity* of the geographical distribution of *P. argentipes* and kala-azar in India . . .'

(c) Sinton (1925). 'As a result of this investigation it was found that there was a close relationship* between the recorded areas of distribution of *Phlebotomus argentipes* and that of kala-azar'.

(d) Christophers (1926) ' . . . as pointed out by Sinton (1925) the distribution in India coincides very closely* with that of *P. argentipes*'.

(e) Shortt et al. (1928). 'In 1922, Major J. A. Sinton, V.C., I.M.S., in a private communication to Lieut.-Colonel R. Knowles pointed out that the known distribution of *P. argentipes* in India corresponded closely* with that of kala-azar'.

The 'close relationship', 'apparent identity' and 'coincides very closely' are now whittled down to the following recent pronouncement by Shortt (1946). 'Although the actual record appears to be lost, there is no doubt that in 1922 Sinton, in a private communication to Knowles, pointed out that there appeared to be some correlation* between the distribution of kala-azar in India and that of *Phlebotomus argentipes*'.

Further argument on this point may now be left to the sophists.

2. In our article we remarked that it was difficult to understand why kala-azar is not endemic in Ceylon in spite of the fact that the islands almost linking Ceylon to the east coast of India are heavily infected with kala-azar and *P. argentipes* is present in Ceylon. Shortt replies that this 'is sufficiently explained by the fact that kala-azar is practically non-existent in these areas' (Bombay and Ceylon) and goes on to say : 'The same argument might have been used in the case of Assam before that province had cases of kala-azar imported . . .'. The argument is weak and the statement that kala-azar is practically non-existent in Ceylon

is quite misleading. Infected coolies have been imported into Ceylon year after year yet the disease has never spread to the indigenous population, while in Assam, village after village was readily infected by one or more infected persons. Since there is no evidence to show that *P. argentipes* are less numerous or less ready to bite human beings, or less addicted to raisin juice in Ceylon than in Assam, the writer must seek for some other explanation.

The comparison between malaria in Great Britain and kala-azar in Ceylon, which Shortt next introduces, is equally fallacious. Social, economic, environmental and hygienic conditions are entirely different in the two countries and there is no endemic centre of malaria near to Great Britain corresponding to the kala-azar-infected islands between India and Ceylon. Moreover, the fact noted by Shortt that the introduction of cases of malaria into Great Britain after the 1914-18 war, was followed by sporadic outbreaks of the disease, while the introduction year after year of kala-azar cases from India to Ceylon has no such effect would suggest that the anophelines in Great Britain are efficient carriers of malaria while *P. argentipes* in Ceylon are not.

3. The real issue, however, is not whether kala-azar is absent in the presence of *P. argentipes* but whether true indigenous cases are to be found in the absence of the sandfly. If this can be established the case against the sandfly must be dismissed.

We mentioned two indigenous cases occurring at Sanawar Military School in the Simla Hills (5,760 feet above sea-level) which occurred at a time when *P. argentipes* had not been found there, even though sandflies had been carefully looked for and 'several thousand specimens of this genus have been examined during the last seven years from areas within a few miles of Sanawar' (Sinton, 1927). In his paper Savage (1927) says : 'Neither of these boys can be traced to have ever visited any of the known endemic areas and hence they cannot be considered as imported infections'. 'That infection had occurred in Sanawar appears to me undoubted . . .'. Since Savage was medical officer of the school and already had under his care a case of kala-azar imported into the school from Madras, we must presume that he investigated the history of these unique cases very thoroughly before deciding that they were indigenous. There was no question at the time of these cases not being indigenous. Savage who was not an opponent of the sandfly theory notes :—

'*P. major* is the only sandfly that has been identified' and says in the concluding sentence of his paper : 'The object of this article is to draw attention to the possibility of *P. major* being a carrier of kala-azar in India, and to a hill station being an infective focus, with different regional conditions from the present known endemic areas'.

* Our italics.

The Editor's footnote to this article is illuminating: '(Note: It has been shown by the workers in China that *Leishmania donovani* will develop in the mid-gut of *Phlebotomus major*—Editor, *Indian Medical Gazette*)'. The editor not only accepts the view that the cases were indigenous, but endeavours, by subtle suggestion, to incriminate *P. major* in the absence of *P. argentipes*.

About six months later, Sinton (1927) in a letter to the Editor, *Indian Medical Gazette*, records that in a collection of *Phlebotomus* from Sanawar village given to him by Captain P. J. Barraud, F.E.S., F.Z.S., there were several specimens of *P. argentipes*. He mentions this as an illustration of the extremely localized nature of the distribution of the different species of *Phlebotomus* in an area.

At the meeting of the Far Eastern Association of Tropical Medicine (December 1927), in reply to Dr. U. N. Brahmachari's reference to kala-azar in Sanawar, Colonel Knowles said: 'Major Sinton has informed me that they have now found *P. argentipes* there. Here we have a most important and interesting finding, you find a patch of *argentipes* infection at a high altitude, and with it you find an isolated crop of kala-azar cases, presumably following after the importation of an infected person'.

Here again there is full acceptance of the view that the cases were truly indigenous, but now it is *argentipes* that is incriminated. In their enthusiasm for *argentipes* the exponents of the sandfly theory have overlooked two points mentioned by Sinton: (1) The flies were caught in Sanawar village (where no cases had occurred), two miles away from the school (where the cases had occurred but no *argentipes* had been found). (2) The distribution of the different species of *Phlebotomus*, in an area, is extremely localized.

We are now told by Shortt: 'The remarks on a few cases occurring in Sanawar in the Himalayas hardly call for an answer, because the facts about them were never sufficiently cleared up, and it is most probable that the cases did not acquire their disease locally, but actually came to Sanawar already infected in another part of India'.

There would appear to be no reason (and the writer has given none) for accepting, at this late date, a bare denial that the Sanawar cases were truly indigenous.

We suggested that George Town, Madras, provided another example of the presence of kala-azar, in a particular area, in the absence of *P. argentipes*. Kala-azar has been endemic in George Town for a long time, certainly before 1903. Patton who worked in Madras for several years failed to find *P. argentipes* in George Town up to 1922, *P. minutus* being the only species found. In 1926 during a flying visit of a fortnight Barraud finds *argentipes* in the majority of houses in the same area searched by Patton. We suggested that *P. argentipes*

might have been introduced into George Town between 1922 and 1926. Shortt replies: 'This sudden extension of the range of *P. argentipes* is not explained by them!' It would appear from the note of exclamation that he considers our suggestion to be ridiculous. The economic entomologist would not think so, and many examples of just such a phenomenon have been recorded. Indeed Napier (1926) argues, in support of the sandfly transmission theory, that the introduction of the transmitting agent was the determining factor in the introduction of kala-azar into the Assam valley. An argument that is considered reasonable enough when it supports the sandfly theory is ridiculed when it opposes that theory.

Again, by this easy dismissal of our suggestion, the writer is placed on the horns of a dilemma. For, if our explanation is incorrect, either Patton who failed to find *P. argentipes* when they were present was careless or incompetent, or Barraud who found them when they were not there was mistaken or dishonest. We have assumed (and rightly so) that both of these eminent workers were competent, careful and honest and we have accepted their findings as being correct. On this assumption we consider our suggestion that *P. argentipes* had been introduced into George Town between 1922 and 1926 to be a reasonable one.

Although these two examples do not afford proof that indigenous cases of kala-azar occur in areas where *P. argentipes* is absent, yet they have considerable value as the negative observations of two experts in the field of entomological research.

To summarize:—

1. The age, sex and race incidence of kala-azar cannot be reconciled with the sandfly theory of transmission; the writer has made little or no attempt to refute this statement.

2. There is evidence to suggest that indigenous cases of kala-azar may occur in areas where *P. argentipes* are absent.

Other possible methods of transmission

It is admitted that on a *priori* ground, the biologists have reason to suspect that kala-azar is transmitted by an insect vector, and it has been proved that, under certain laboratory conditions, *P. argentipes* can be an efficient vector. We maintain, however, for reasons previously given that this does not prove that they are the actual vector *in nature*.

That was the main object of our article. We, however, suggested that not only should the habits and behaviour of the sandfly, in nature, be thoroughly investigated, but the old-fashioned idea of transmission through personal contact should be further explored.

We quoted the observation of Rogers (1914), Korke (1913) and Michael (1926) in support of the view that close contact is a probable method of infection. Shortt's reply is that *P. argentipes* was common in the areas investi-

gated by those writers and 'that there is every chance of its becoming infected from the case or cases with which people are in contact, and so passing on the infection to the latter'. This possibility is admitted but the observation made by Korke that the disease was almost entirely confined to Anglo-Indians in the streets occupied equally with other communities and the careful house-to-house investigation of Michael showing the distribution of the cases in order of their occurrence suggested that close personal contact was much more likely to be the method by which the disease was transmitted.

Greig and Christophers (1926) stated: 'The way in which cases of kala-azar occur in infected families, one case following another in slow succession, is very characteristic of carrier transmission as seen in enteric, where infection is through the soiling of food, etc., more especially from the urine'. 'There is no inherent improbability, therefore, in so far as general epidemiological facts are concerned, in the view that kala-azar might be transmitted by contact infection'.

Later the Kala-azar Commission, with Shortt as Director, proved that *L. donovani* were excreted in the urine and faeces of kala-azar cases; that the forms of *L. donovani* found both in the human body and in test-tube cultures can infect susceptible animals when administered by the oral route; and that infected animals housed in proximity to uninfected animals were able to infect the latter (see Report of the Kala-azar Commission, 1932, p. 65). It is a pity that this promising line of research was not pursued much further.

L. donovani has been found frequently in the skin. 'All levels of the skin below the epidermis contained leishmania-filled cells collected in large masses about the sweat glands and arterioles and scattered diffusely through the corium' (Manson-Bahr, 1935). In the Soudan and in China this phenomenon is seen in ordinary visceral kala-azar; in India the parasite is frequently found in dermal lesions.

Napier (1935) considers that a dermal infection is a constant sequel to a visceral infection, whether the patient has received treatment or not and argues that the dissemination of the parasites to their dermal foci takes place during the visceral phase. *L. donovani* have been recovered from the skin when blood cultures were negative in clinically cured cases and in cases where dermal lesions are hardly apparent or not apparent at all.

From our point of view the presence of *L. donovani* in the skin suggests that the disease may possibly be transmitted directly from skin to skin, through abrasions, for example, and that an intermediary insect vector may be an unnecessary complication.

Shortt states: 'The fact that the parasites in the blood are usually not free but within the elements of the reticulo-endothelial system, is only natural, since that is their natural habitat'.

This explanation may be correct especially in view of the fact that the parasite appears to multiply in lymphocytes, but it should also be borne in mind that such parasites are admittedly phagocytosed and it is possible that such phagocytosed parasites are *not* in their 'natural habitat'.

Unless and until it is proved that wild flies and flies bred and reared under laboratory conditions will act in the same way, further argument would appear to be fruitless.

In conclusion, we ask our readers to study the main arguments against the sandfly transmission theory under the heading 'Bionomics of *P. argentipes*' and 'Epidemiological Factors' and to decide for themselves whether the protagonists of the theory have proved their case or not. It is apparent that sufficient attention has not been paid to the study of *P. argentipes* in nature, and the mass of epidemiological evidence which casts grave doubt on the correctness of the sandfly transmission theory of kala-azar has been ignored or denied.

In self-defence

We must protest against the suggestion made by Colonel Shortt at the meeting of the Royal Society of Tropical Medicine and Hygiene (17th May, 1945) that criticism of a scientific investigation should be confined to those who have worked in that particular field of research. It is the privilege, and indeed the duty, of anyone to offer his criticism provided it is fair and logical.

We regret that Colonel Shortt's reply to our article has offended in both these respects.

The introductory remarks in his paper clearly reveal the temper with which he has approached the problem. He opens on a facetious note which calls for no comment from us, then makes much play of two mis-statements in the opening section of our article which he ascribes, incorrectly and without justification, to 'the casual manner of their reading of the works of others'. He is, however, not generous enough to point out that neither of these mis-statements has the slightest bearing on the arguments put forward by us.

In the main part of his paper he accuses us of lack of knowledge or of ignorance, either without justification or in the face of evidence to the contrary presented in our article. We are also accused of drawing inferences which we did not draw.

Some of our arguments have been misunderstood or misinterpreted; others have been avoided.

In quoting from our article portions of a sentence have been omitted and sentences removed from their context so as to give an erroneous impression of our meaning or intention.

In cases where the onus of proof lies upon the protagonists of the sandfly transmission theory he has attempted to shift it to their critics.

In short, his paper does not provide the kind of reply expected of a scientist of high repute but rather that of a pleader who has a weak case which he is compelled to defend.

In this rejoinder we have endeavoured to deal, fairly and without rancour, with his objections to our contention. We have tried to avoid as far as possible controversy on points which we consider to be of secondary importance or have only an indirect bearing upon our main arguments.

We apologize if in treading on this holy ground sacred to the pundits we have inadvertently trodden on the tails of their coats. Although the accuracy of some of our statements may be questioned our main arguments cannot be ignored, and we hope in the near future to see in this journal, or in any other of equal repute, an advertisement to this effect:—

Wanted

A team of young and enthusiastic research workers to study the life history of *Phlebotomus argentipes* in nature. Special training in tropical diseases is not essential.

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Medical News

NOTIFICATION OF THE BOMBAY MEDICAL COUNCIL

No. G/16 of 1947

THE names and addresses of the following candidates who have been duly nominated for election as members of the Bombay Medical Council under the Bombay Medical Act, 1912 (Bombay Act VI of 1912) as amended by Bombay Acts No. III of 1916, No. IV of 1918, No. XII of 1929 and No. III of 1945, are published in accordance with the Rules and Regulations of this Council:—

No. G. 16/1 of 1947

Notice to the Electorate constituted by sub-section (c) and sub-section (d), respectively, of section 2(2) of the Bombay Medical Act, VI of 1912, as amended by Bombay Acts No. IX of 1912, Nos. III and IV of 1946, No. IV of 1918, No. XII of 1929 and No. III of 1945.

Whereas in section 3(1) of the Bombay Medical Act, VI of 1912, it is laid down that the members of the Medical Council shall hold office for a term of five years, and whereas the term of office of the existing six elected members of the Bombay Medical Council expires on the seventeenth day of September 1947.

Now, therefore, in accordance with rule 11 of the Rules and Regulations of the Bombay Medical Council, approved by the Governor of Bombay in Council and published in Bombay Government Notification (General Department), No. 6773, dated the 22nd September, 1913 (as amended from time to time) the two Electorates mentioned below are required to elect members in the room of the six elected members whose term of office expires on the seventeenth day of September 1947.

Under sub-section (c) of section 2(2) of the Bombay Medical Act, VI of 1912, as amended by Bombay Acts Nos. III and IV of 1916, No. IV of 1918, No. XII of 1929 and No. III of 1945, four members are to be elected by Doctors, Bachelors and Licentiates of Medicine, and Masters, Bachelors and Licentiates of Surgery of the University of Bombay, who are registered under this Act.

Under sub-section (d) of section 2(2) of the Act, two members are to be elected by the medical practitioners who are registered under the Act and who are not Graduates in Medicine or Surgery or Licentiates in Medicine or Licentiates in Medicine and Surgery of the University of Bombay.

Persons nominated as candidates under section 2(2) (c) of the Act

No.	Name	Qualification	Address
1	Dr. Vasant Keshav Chitnis ..	M.B.B.S. (Bom.), D.O. (Bom.)	Honorary Ophthalmic Surgeon, Sir C. J. Ophthalmic Hospital, and Professor of Ophthalmology, Grant Medical College, Byculla, Bombay.
2	Dr. Rustamji Nassarvanji Cooper	M.B.B.S. (Bom.); M.S. (Lond.), F.R.C.S. (Lond.).	Marshal Lodge, Cumballa Hill, Bombay.
3	Dr. Mahadev Dattatraya Joshi	M.B.B.S. (Bom.), D.M.R.E. (Camb.), F.C.P.S. (Bom.).	Dr. Bhajekar Street, Bombay Nursing Home, Sandhurst Road, Bombay 4.
4	Dr. Chamanlal Maneklal Mehta	M.B.B.S. (Bom.), F.R.F.P.S. (Glas.).	2nd Dadiseth Road, Babulnath, Bombay 7.
5	Dr. Gopal Krishnayya Mulki ..	M.B.B.S. (Bom.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), F.R.C.S. (Eng.).	C/o S. K. Mulki, Esqr., Allahabad Bank, Bombay.
6	Dr. Rangarao Damodar Naik ..	M.B.B.S. (Bom.)	Lady Jamshedji Road, near P. O., Dadar, Bombay 14.
7	Dr. Motibhai Desaiabhai Patel ..	M.B.B.S. (Bom.), L.R.C.P. (Lond.), F.R.C.S. (Eng.).	Vadilal Sarabhai General Hospital, Ellis Bridge, Ahmedabad.
8	Dr. Nilkanth Lakshman Ranade	M.B.B.S. (Bom.)	330, Sadashiv Peth, Poona City.

Persons nominated as candidates under section 2(2) (d) of the Act

No.	Name	Qualification	Address
1	Dr. Dattatraya Mahadev Akut	L.C.P.S. (Bom.)	204, Rasta Peth, Poona City.
2	Dr. Keshavlal Jivanram Bhatt	L.C.P.S. (Bom.)	235, Ghosiram's Pole, Ahmedabad.
3	Dr. Udyavar Bhadya Narayanrao	L.C.P.S. (Bom.)	1, Damodar Mansions, Opera House, Tram Terminus, Girgaum, Bombay 4.
4	Dr. Vaman Dinkar Sathaye ..	L.C.P.S. (Bom.)	502, Narayan Peth, Poona City.

SWADESHI MILLS ESTATE,
New Queen's Road, Post No. 4,
Bombay, the 5th August, 1947.

B. M. SIDHAYE,
Registrar, Bombay Medical Council
and Returning Officer.

Any person who is qualified for election to the Council under section 2(2) of the Act may be nominated as a candidate for election either under sub-section (c) or under sub-section (d) of section 2(2) of the Act.

Candidates qualified for election must be proposed and seconded by persons qualified as electors, i.e. by persons borne on the Bombay Medical Register on the 30th June, 1947, no elector shall propose or second the nomination of more persons than are required to fill up the vacancies. If more nominations than are required to fill up the vacancies are subscribed by the same elector, all nominations subscribed by him shall be void.

Every candidate for election shall sign the nomination paper declaring that he is willing to serve on the Council, if elected, failing which the nomination paper shall be invalid.

Every proposal for nomination must be in writing and must be dated and signed by the proposer and seconder who must be qualified as elector, and must be sent by post or otherwise so as to reach the Returning Officer at the office of the Bombay Medical Council, Swadeshi Mills Estate, next to Roxy Cinema, New Queen's Road, Bombay No. 4, not later than 5 p.m. on Monday, the 4th August, 1947.

Forms of nomination will be supplied to any elector on application to the Returning Officer.

Monday, the 25th August, 1947, has been fixed as the date for the issue of voting papers to electors. Voting papers should be despatched so as to reach the Returning Officer not later than 12 noon on Monday, the 15th September, 1947.

Monday, the 15th September, 1947 (2 p.m.), has been fixed as the date for the counting of votes at the office of the Bombay Medical Council, Swadeshi Mills Estate, next to Roxy Cinema, New Queen's Road, Bombay No. 4.

Only those whose names stand on the Electoral Roll prepared in accordance with rule 12(1) of the Rules and Regulations of the Bombay Medical Council, will be entitled to vote. The Electoral Roll can be seen

at the office of the Council on any weekday during office hours.

B. M. SIDHAYE,
Registrar,
Bombay Medical Council,
and Returning Officer.

SWADESHI MILLS ESTATE,
NEXT TO ROXY CINEMA,
NEW QUEEN'S ROAD,
BOMBAY 4.
21st July, 1947.

EDINBURGH AS POST-GRADUATE CENTRE

(Abstracted from the *Lancet*, i, 14th June, 1947, p. 838)

THE Edinburgh Post-Graduate Board for Medicine is at present conducting short refresher courses and four long courses per year—two in internal medicine and two in general surgery. Applications for enrolment far exceed vacancies, and selection of candidates according to qualifications and experience is made.

Edinburgh was always known as a gathering-point for overseas students, and the present post-graduate classes contain an ever-increasing number of graduates from South Africa, Canada, India, and other parts of the world. Undoubtedly, some Dominion visitors particularly those from Australia and New Zealand, who formerly came in large numbers, are deterred by the fear that they may not find accommodation. The board helps, where it can, by passing on the addresses of recommended lodgings and private hotels; but their number is often insufficient, and the authorities are seeking to buy a building capable of housing 80 to 100 students.

MOTOR-CARS IN FRANCE: THE FLIGHT OF PARISIAN DOCTORS

(Abstracted from the *Medical Journal of Australia*, Vol. I, 7th June, 1947, p. 709)

MEDICAL practitioners who are having difficulty in securing suitable motor-cars for their daily requirements

in practice will be interested in a report published in *The Times* of 8th March, 1947. It is stated that more than eight hundred doctors of the Paris region marched through the heart of the city in protest at what they considered were insufficient transport facilities. They carried placards asking for more motor-cars, and on the placards were such slogans as: 'Cars exported to get dollars'. 'How many dollars is the life of a Frenchman worth?' A letter was handed to the Minister for National Economy stating that two thousand Parisian doctors were without motor-cars, that others had only 'wheezing' vehicles, and only sixty-three motor-cars, had been distributed between seven thousand doctors since the liberation. The Minister replied that three hundred new motor-cars should be distributed amongst doctors every three months and that the quota would soon be increased to four hundred.

CHANG SHAN IN THE TREATMENT OF MALARIA

(Abstracted from the *Journal of Tropical Medicine and Hygiene*, Vol. 50, No. 4, April 1947, p. 75)

Chang Shan, an indigenous Chinese drug, has been found effective in the treatment of benign and malignant tertian malaria.

ANTI-TUBERCULOSIS CHALLENGE SHIELD

The Tuberculosis Association of India awards the Subhwardy Memorial Anti-Tuberculosis Challenge Shield annually to the organization or institution which has the best record of effective anti-tuberculosis work done within that year.

Anti-tuberculosis work for the purpose of this competition includes, among other activities, house-visiting and contact examinations, propaganda, anti-tuberculosis legislation, surveys, insurance, medical examination of school children, housing schemes, care and after-care committees and such other details which the Association prescribes.

Competition for the Shield is open to Corporations, Municipalities, affiliated Tuberculosis Associations, District or Local and other recognized bodies doing anti-tuberculosis work.

The following three items are reproduced from Release No. MNL/114 offered by the Public Relations Officer, Australian High Commissioner's Office New Delhi:

Australian State Plan for Dental Health

The State Government in Victoria (Australia) will spend Rs. 10,00,000 on the extension of school dental services. The aim of the plan is to expand the service gradually until it reaches every school child.

State Minister for Health, Mr. Barry, said the plan provided for: appointment of many more qualified dentists; establishment of permanent clinics in the larger provincial cities, with one or more mobile units to visit surrounding country schools; temporary clinics in the larger schools along railway routes, small schools to be served by additional dental vans operating over wide areas in every part of the State.

In Victorian State and denominational primary schools there are 250,000 children. The Government's plan aims at offering the facilities of the dental service to every school-age child, with one treatment per child annually as the minimum.

Until the fulfilment of the plan, to be considered by Cabinet, it is estimated that a staff of 70 dental officers would be required to operate 15 mobile dental vans, and give service at the headquarters and other clinics.

Degree of the extension of the service planned is indicated in that during the year ended 30th June, 1947, approximately 18,500 treatments were given to 13,500 school children in Victoria at the State dental clinic and mobile vans.

Segregation of T.B. Patients Halves T.B. Infection Risk Among Australian Nurses

Skin tests of 2,700 Sydney nurses carried out by a Sydney physician, Dr. Douglas Anderson, M.D., M.R.C.P., F.R.A.P., over five years show that the risk of infection was more than twice as great when tuberculosis sufferers were cared for in the general medical wards than if they were cared for in special wards.

The tests were carried out on the nurses of three of Sydney's largest hospitals. At the first and third hospitals there were 27 and 26 infections respectively for every 100 nurses per year of observation, while at the second hospital there were only 11 infections for every 100 nurses per year.

At the first and third hospitals patients with pulmonary tuberculosis were nursed in the general wards, while at the second hospital patients known or found to have tuberculosis were placed in special wards and cared for by a general staff. Even then the nurses' risk of infection (11 per cent) was three times as great as that among young women in the general Australian population (where infections have been shown to be 3.5 per cent).

However, infection with tubercle bacilli very rarely leads to lesions of the lung in Australia; lesions developed in only 15 of 2,300 nurses tested during their five years' professional training.

Dr. Anderson used an Australian technique which enabled him to carry out each skin test with only a single injection of the purified protein derivative of tuberculin ('Tubercilin P.P.D.'), thus avoiding a sore arm in the case of those who react very sensitively. The new Australian technique which has been found to be satisfactory as well as time-saving, is to inject a strong solution with enough tuberculin to get a reaction from all persons tested, but in a very small bulk of one-fortieth of a cubic centimetre.

Delicate Operation Restores Hearing

Medical circles in Australia are showing great interest in a series of delicate fenestration operations for the restoration of hearing performed by surgeons who studied the technique under the noted American Surgeon, Dr. Julius Lempert.

The operation, known as the Lempert fenestration method, consists of making an opening, or window, to the inner ear to permit the entry of sound waves, and is suitable only for hereditary deafness produced by abnormal growth of bone over the natural opening. This type of deafness is known as otosclerosis.

Exhaustive clinical and audiometric tests are made before the operation, and the family history of the patient is studied, before it is known whether the case can be treated successfully.

Fenestration technique restores hearing by giving the patient a new freely vibrating window to receive sound impulses. The new opening is made by drilling through the mastoid antrum, to the lateral semi-circular canal, enlarging the window by burring, and then drawing a tongue of skin over it from the external canal.

An Australian surgeon performing the operation in Melbourne, recently returned from the United States where he studied ear operations in Boston and New York. He worked for some time under Dr. Julius Lempert.

He states that 54 per cent of fenestration operations in the United States are successful. Early results from operation in Australia are promising. Almost complete hearing has been restored by each operation, but a conclusive result cannot be guaranteed until it is certain that the bone-forming processes will not begin over again and cover over the newly-made window. In that case, a further operation is necessary.

Public Health Section

THE CARE OF PREMATURE INFANTS

By W. C. HANSZE, L.M.P. (Madras)

Group Medical Officer, Mulhalkelle, Halgranoya, Ceylon

ALL infants born before full term, that is, before the fortieth week of pregnancy, may be considered as premature. The diagnosis of prematurity depends not only on the period of gestation when the child is born but also on its weight at birth. Children born before the thirty-sixth week of gestation and weighing less than $4\frac{1}{2}$ pounds are to be treated as premature and require more elaborate care than those born at term. The most important points to be noted in their management and care are :—

1. The baby must be kept in a warm room on a well-padded cot. In cold climate or cold weather hot-water bottles should be placed on each side under the side pillows and slightly away. It is most important to conserve the heat of the body. The temperature should be taken with a thermometer in the fold of the groin morning and evening. When incubators are available the temperature in the incubator should maintain a uniform level of about 78°F ., and there should be efficient ventilation within the incubator. In dealing with these it is essential to maintain the body temperature at 98° to 99°F . To ensure this the temperature must be recorded every 4 hours.

2. The infant should be clothed warmly but not so as to impede the free movements or interfere with the process of respiration or to the extent of perspiration. No tight-fitting clothing about the chest or abdomen should be encouraged. The body should be gently rubbed with sesame or olive oil slightly warmed morning and evening and wrapped in cotton-wool. In cold countries the feet and hands should also be protected by flannel gloves or wrapped in small quantities of cotton-wool. Pieces of cotton-wool should be used as napkins. The child should be disturbed as little as possible, yet frequent changes of the napkins are necessary, so that the solid pieces of cotton may not be in contact with the tender skin. The infant should be carefully guarded from infections. A premature infant should not be bathed until it has gained in weight after which it may be sponged quickly with warm water twice or thrice a week, and it should be weighed in the same clothing from day to day. When good nursing can be obtained, the premature infant does much better at home than in hospital, because of the added risk of infection in institution. All nurses should wear efficient masks and sterilized gowns when handling an infant like this.

3. All feeding utensils should be boiled. There should be as few visitors as possible and they should not handle the infant. Any slight infection, particularly the common cold, may rapidly prove fatal to the premature infant. The child's skin, particularly about the buttocks and navel, must be inspected daily for signs of sepsis, and should be kept dry with sterile dusting powder.

4. Writer's favourite treatment is with oestroform tablets (British Drug Houses preparation). Take one tablet (1,000 I.U.) of oestroform, dissolve it in 2 drachms of water, give one drachm in the morning and one drachm in the evening until the child is progressing satisfactorily. Twenty premature infants responded very well with this line of treatment.

Now comes another important item, *viz*, feeding according to Steen's recommendation giving breast milk diluted with equal quantity of boiled water for the first few days. Commence with half to one ounce of breast milk per pound of body weight daily or one to two drachms per feed. By the fourth day try giving two ounces of breast milk per pound of body weight per day and by the tenth day or so the ideal of three ounces per pound of body weight may be reached. Some babies cannot be advanced so rapidly and it may be 20 days before the ideal is attained. Writer tried this method with excellent results.

In-feeding do not exhaust the child by making it suck for long. If it is weak or is not obtaining sufficient breast milk employ manual expression and give the milk off a spoon to the baby while it is in the cot. Two-hourly feeds may be required. Writer recommends an excellent premature feeder made by Messrs. John Bell and Croyden, 50 Wigmore Street, London, W.1, and termed the Belcroy Feeder. This is most useful when there is difficulty in getting the infant to suck. At all times the hole in the teat should be made extremely easy. Glaxo Company, Allen and Hanbury's and other firms manufacture a special bottle and small teats for premature infants. When the breast milk is not available, writer recommends *Hæmolac*, a dried milk powder to which iron has been added prepared by the Cow and Gate Company, as an excellent food at this juncture, or 5 or 10 drops of a solution of ferri et ammon cit. (one grain to one drachm) may be added to each feed. The most important point to be borne in mind is that the premature infant is born without that reserve of iron stored in the liver which carries the full-term child through the period of lactation. Anæmia is therefore liable to appear about the end of the third month and must be corrected either by giving a small quantity of

Marmite Soup daily or by the administration of some easily absorbed form of iron. The premature is specially liable to develop rickets. As soon as the diet is fully established Emulsion of Cod-liver Oil with Metagen (P. D. & Company preparation) is a valuable nutrient tonic which has been found excellent in many cases by the writer. Some form of vitamins such as Ostelin, Radiostoleum, Adexolin and the like contain concentrated vitamin D, and a few drops a day is needed. Directions are sent with vial. Fresh fruit juice, preferably orange juice one teaspoonful a day, should also be given to provide the anti-scorbutic factor.

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ERRATUM

OBSERVATIONS ON ANÆMIA IN THE MALNAD PARTS OF THE MYSORE STATE

By N. A. AIENGAR, L.R.C.P., M.R.C.S.
District Medical Officer

B. R. LAXMINARASIMHALU NAIDU, L.M.P.
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In the above article published in the *I.M.G.*, Vol. LXXXII, No. 8, August 1947, on page 488, column 2, line 8, for 'ancylostomiasis' read 'anæmia'.

The Indian Medical Gazette Fifty Years Ago

THE HEALTH OF PRISONERS

(Reprinted from the *Indian Medical Gazette*, Vol. 32, September 1897, p. 344)

THE sick and death-rate amongst prisoners in Indian jails is a subject which frequently gives rise to much adverse criticism amongst a certain section of politicians and jail reformers at home, who, through ignorance of the conditions under which Indian prisoners live previous to, and their physique on admission into jail, etc., are ever ready to attribute excessive sickness and mortality to some defect or other in the jail itself or its administration. The vital statistics of the present day (excepting epidemic years) compare favourably with those of past years—a result which, in our opinion, must be ascribed for the most part to the increased attention given to sanitary regulations in the matter of accommodation, ventilation, water-supply, food,

clothing, the disposal of the excreta of both the healthy and sick, and the precautionary measures adopted to check the dissemination of infectious and contagious epidemic diseases. We would not for a moment say that the sanitary arrangements are perfect, but that they have undergone considerable improvement within recent years is undeniable. Despite all this, however, there remain factors conducing to unhealthiness, over which superintendents and medical officers can exercise no control whatever, viz the widespread prevalence of malaria and its concomitants, the habits and customs of prisoners before admission, the extreme variation of climatic conditions at different seasons of the year and even at different hours of the same day—diseases acquired during transfer, from one jail to another, and the effect of the change from a home life, however humble, to that of a solitary existence, which is perhaps more felt even by the most despicable native criminal than by prisoners in English jails.

Moreover, the native of India, as a rule, dislikes hard labour intensely, and, while in jail, practises all kinds of deceptions and malingerings with a view to being sent to hospital, and may be safely entrusted by some device or other to raise his temperature to hyperpyrexia at a moment's notice, or by the consumption of unhusked rice, green fruit, raw vegetables or other objectionable material produce such an attack of dysentery or diarrhœa as will almost defy the best attempts of the medical officer to effect a cure.

When everything is said and done, we venture to believe that the death-rate in Indian jails might be still further reduced by the employment of a well-trained nursing establishment, and, if the suggestion is at all practicable, it seems desirable that something should be done in this direction. The provision of wards for prisoners admitted into jails in a moribund condition and a hospital to be specially set apart for those suffering from incurable diseases is, we think, deserving of consideration. The medical officer, who hopes to suppress *in toto* factors conducing to unhealthiness amongst Indian prisoners, has his task before him.

LONDON LETTER

(Reprinted from *The Indian Medical Gazette*, Vol. 32, September 1897, p. 347)

BERI-BERI has broken out again in the Richmond Lunatic Asylum, near Dublin. One hundred and twenty-four cases have occurred since the beginning of June—90 female patients, 3 nurses and 30 male patients. The disease first made its appearance in the institution in the year 1894, and has continued to prevail at intervals up to the present time. The authorities are greatly exercised regarding it. The question of origin is shrouded in dense darkness, and will

probably never be solved. The asylum is damp and overcrowded; but this does not account for the appearance of so specific a malady. Once introduced, the conditions—feeble resistance, humidity and crowding—are eminently favourable to its maintenance and spread; but it is impossible to admit the spontaneous generation of a tropical disease in an institution situated in a temperate climate. Cases of beri-beri are continually being imported into our large seaports, but no extension of the disease has ever been known to take place in London, Liverpool, or Glasgow. It is true that personal communication plays a very small part in its dissemination, and that it is a localized distemper flourishing in unhealthy places inhabited by dense communities, such as crowded jails and stuffy forecastles. Still these facts do not render much assistance in explaining its entry into this asylum. The alternate prevalence and latency which have been observed are of seasonal causation, warmth being evidently a necessary element of vitality and propagation of the micro-organism to which the disease is due. The precise microbe which causes beri-beri is a matter of some uncertainty. Different observers have described several different forms; but there is good reason for the belief that the micro-organism of Pekelharing and Winkler is the veritable *causa causans* of the disease. At any rate there can be no manner of doubt that very radical measures are necessary in order to extirpate the malady from the Richmond Asylum. The abandonment of the building and the erection of a new one on a drier site would probably be the best course; but the temporary removal of the patients and reconstruction of the asylum on a larger scale and with all possible sanitary improvements seems to be imperative.

The bacteriology of yellow fever is exciting some interest at present. Not long ago the announcement was made that the specific bacillus of the disease had been discovered by Dr. Sanarelli. Now a competitor has appeared in the field, and Dr. W. Hanelberg of Rio de Janeiro has described an organism differing from that of Sanarelli in many important particulars, which he considers to be the true cause of yellow fever. Which of the two will finally establish its claim will depend on further investigation. But these sudden upsets are very disconcerting. To expect finality in the vital sciences is, of course, out of the question; but of all vital sciences bacteriology seems to be the most unsettled. A position is laid down one day which presents every appearance of stability; but the storms and floods of criticism and fresh discovery beat against it next day, and show by its quick demolition that it was founded on the sand. Witness the uncertainty that prevails regarding the causation of cholera and typhoid fever, and the shifts to which the supporters of Koch's vibrio and Eberth's bacillus are put to square their hypothesis with inconvenient facts. Nothing seemed more secure a short time ago

than the truth and practical value of Vidal's sero-diagnosis of typhoids, and yet we have Kanthack declaring in the last issue of the *British Medical Journal* that he obtained a typical positive reaction with serum from a patient in whose body after death no lesion of enteric was found. It is hard to be in a state of continual provisional belief in regard to these matters; but it would be still more painful to inhabit a fool's paradise and find the palatial building every now and then tumbling down and leaving one stunned, startled and houseless. After all, doubting has its advantages and pleasures and after fully discounting the uncertainties of bacteriology there still remains a grand residue of established facts for which we are bound to be very grateful.

I had the pleasure of attending the prize-giving at Netley on Friday last. The function was presided over by Major-General Sir William Butler, K.C.B., commanding the South-Eastern (Dover) Division, who discharged the duty with grace and ability. The mess gave a dinner to Dr. Cayley on the 29th on the occasion of his vacating the chair of Military Medicine. The competition for admission into the medical services is going on at present. I hear that there are 37 applicants for 18 vacancies in the Indian Medical Service and 27 competitors (!) for 30 declared vacancies in the Army Medical Staff. The latter service does not gain in popularity notwithstanding the redress of several grievances, and it is becoming apparent that the service must be rendered more attractive if it is to retain its prestige and efficiency.

I am sorry to observe that the Calcutta Medical Society is in a state of dormancy. It has now attained an age which ought to be a guarantee of permanence and there should in Calcutta be no lack of men and materials, nor of ability and ardour to secure its perpetuity and success. It only wants a very moderate measure of interest and industry to make a thing of this sort work. It possesses the great advantage of being associated in practice if not in constitution with a great hospital and school, the officers of which must always have something under observation worth drawing attention to; and the *alumni*—the past students and officials of both—cannot but derive pleasure and profit from revisiting their *alma mater*, renewing their acquaintance with their former haunts and studying the changes in doctrine and method which new years and men are constantly producing. I cannot get myself to believe that there is such a lack of desire to teach and learn and of devotion to the most interesting of all professions and occupations in Calcutta as to permit an institution, which has done good work in the past, to die of inanition. I do hope, therefore, that with the commencement of a new session the Calcutta Medical Society will have started a new era of activity and usefulness.

The 5th August, 1897.

Current Topics, Etc.

Survival of Variola Virus in Dried Exudate and Crusts from Smallpox Patients

(Abstracted from the *Lancet*, i, 26th April, 1947, p. 550)

THE chorio-allantoic membranes of developing hens' eggs which are susceptible to infection with variola virus have been used to detect the presence of virus in vesicle fluid and crusts from smallpox patients.

By this means virus was found to survive in diluted vesicle fluid dried on glass slides for 35 days when exposed to daylight and for 84 days when kept in the dark at room temperature.

Virus was recovered from different samples of crusts kept at room temperature for several months and from one specimen kept thus for over a year.

In crusts exposed to daylight virus survived as well as in crusts kept in the dark.

A Death from Pethidine

(From the *British Medical Journal*, i, 19th April, 1947, p. 548)

THE Westminster coroner inquired on 28th March into a death due to an overdose of pethidine (the hydrochloride of the ethyl ester of 1-methyl 4-phenyl-piperidine 4-carboxylic acid). A clerk of 44 was found unconscious in a Paddington hotel and died soon afterwards. Four bottles of $\frac{1}{2}$ -gr. (50 mg.) tablets, from which 54 tablets were missing, were found in his room. Dr. G. Roche Lynch said in evidence that this was the first fatal case of pethidine poisoning he had met. The drug has an action similar to that of morphine. As it was discovered to produce addiction in some cases it was placed under the Dangerous Drugs Act in February last in England.

Red Cells as a Dressing

(Abstracted from the *Lancet*, i, 3rd May, 1947, p. 604)

LITTLE would probably have been heard of the therapeutic value of powdered human blood cells if they had not been a by-product of plasma extraction. The Mayo Clinic workers have been applying the powdered cells to ulcers of the extremities associated with vascular disorders including thrombo-angiitis obliterans and venous insufficiency from varicose veins. The rationale of this treatment is still obscure; it is suggested that the favourable response observed may depend on partial desiccation, some healing factor in the cells or nutrition supplied by the crust or it may be that the crust encourages healing merely because it is protective and entirely non-irritating. The powder is kept in sterile glass containers and is either applied with a sterile swab or spatula or dusted on from a sprinkler and then loosely covered with a dry sterile dressing. It is reapplied daily after careful removal of the crusts. The results were satisfactory in 24 out of 46 cases and there were only 3 that entirely failed to respond. A considerable number of the patients had previously proved resistant to other forms of treatment. Measures to improve the local circulation must of course not be neglected.

Distribution of Penicillin in the Eye after Subconjunctival Injection

(Abstracted from the *Lancet*, i, 3rd May, 1947, p. 594)

THE distribution of penicillin in the various tissues and fluids of the eye has been studied in rabbits after

subconjunctival injection of 50,000 units of pure sodium penicillin dissolved in 0.5 c.cm. of normal saline into one eye.

In the injected eye high levels were found in all the tissues of the eye except the lens and the vitreous; within three to six hours these levels had fallen to below an adequate bacteriostatic level.

A similar distribution was found in the opposite (uninjected) eye but with lower levels. The penicillin content of most of the tissues of the opposite eye exceeded that of the blood.

The highly purified penicillin now obtainable is non-irritant to the eye and can thus be safely given in large doses by subconjunctival injection with the production of very high local concentrations in the ocular tissues. Its use may prove a valuable advance in the treatment of infections of the eye by penicillin-sensitive organisms.

The following five items are reprinted from a Surgical Newsletter No. W-451, dated May 1947, prepared by the American Medical Association:—

Anatomic Data regarding the Surgical Treatment of Angina Pectoris

SACCOMANNO and his associates point out that the surgical procedures devised for relief of pain of cardiac origin have involved extensive interruption of preganglionic or postganglionic nerve fibres. All attempts, apparently, have been made without complete evidence of the exact origin of the preganglionic and postganglionic sympathetic neurons or of the exact course taken by the afferent pain fibres of spinal ganglion origin which accompany these sympathetic nerve complexes. It is the object of this investigation to determine the exact origin of the preganglionic cardiac accelerator fibres. This was done with the aid of a series of experimental procedures involving direct stimulation of the nerve trunks and roots as they issue from the thoracic spinal cord. Dogs were used as the experimental animals.

Summarizing their observations the authors say that in dogs from which a length of spinal cord had been removed, stimulation of the isolated spinal nerves was observed to produce cardiac acceleration and a rise in systemic blood pressure when the second through the sixth thoracic spinal nerves were stimulated. No change in heart rate or blood pressure was observed when the eighth cervical or first thoracic spinal nerves were stimulated, indicating that these segments do not convey cardiac efferent fibres.

The effect in pulse rate was greatest in the second and third thoracic nerves, with diminishing effect in the fourth and fifth and only very slight effect below the fifth thoracic nerve. The effect on systemic blood pressure was more or less constant from the second thoracic down as far as the seventh thoracic nerve.

Attention is called to the implications of this information as the anatomic basis for a more scientific surgical treatment of angina pectoris. By means of surgical removal or alcohol injection of the second, third and fourth thoracic sympathetic ganglions on the affected side only, a complete alleviation of anginal pain and a reduction of coronary vasospasm should result. This single surgical procedure does not completely interrupt the pathways of sympathetic effector impulses to the head and upper extremity, since the first thoracic segment which conveys fibres to these areas, but which does not convey cardiac afferent or efferent fibres, remains intact.

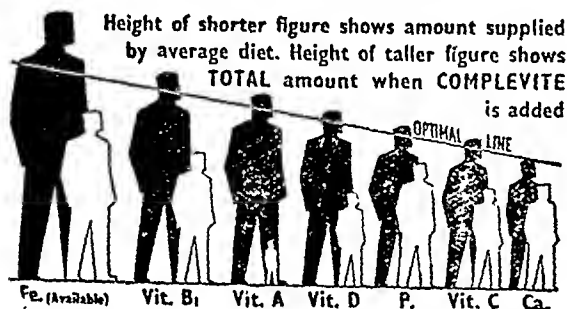
(Saccomanno, G., Utterback, R. A., and Klemme. R. M.: *Ann. Surg.*, 126, 49, January 1947.)

The vitamin intake in Febrile conditions

The restricted diet associated with febrile illnesses involves a reduced intake of vitamins and minerals at a time when the heightened metabolic rate calls for an increase.

A multiple vitamin and mineral supplement (Complevite) is an essential addition to all such diets.

Supplying the full physiological requirements in this way offers the greatest likelihood of shortening the illness.



COMPLEVITE

The adult daily dose provides:—Vitamin A 4,000 i.u., vitamin B, 200 i.u., vitamin C 400 i.u., vitamin D 300 i.u., calcium 153 mg., iron 68 mg., trace minerals 3 p.p.m.

Further particulars concerning Complevite and Fertitol from Martin & Harris Ltd., Mercantile Building, Lall Bazar, Calcutta.

Products of Vitamins Limited, London, England.

A treatment of TENO-SYNOVITIS by means of Elastoplast

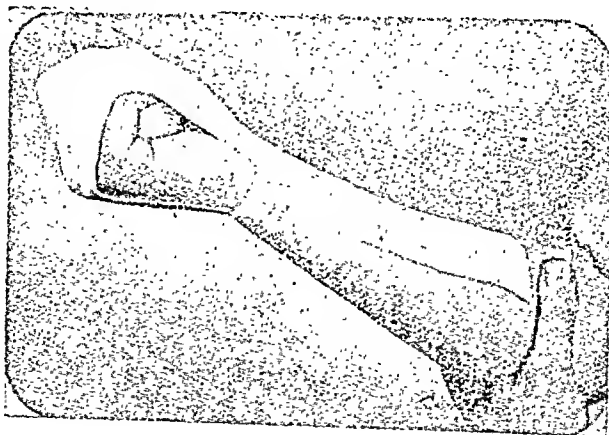
CASE HISTORY

On the 16th January a bricklayer, aged 31, complained of pain at the back of the wrist. It was particularly noticeable when grasping.

A radiograph revealed nothing abnormal, but clinically there was synovial crepitation in the extensors.

Treatment—Fingers immobilised by postero-anterior strips of Elastoplast binding them over a roller bandage. Another turn of Elastoplast bandage strapped the wrist.

On the 23rd January there was still slight pain and



Elastoplast was re-applied to the hand and wrist only.

By the 30th January there were no symptoms.

The patient returned to work after 14 days, but the Elastoplast wrist strapping was retained for a further week.

The details and illustration above are of an actual case. T. J. Smith & Nephew, Ltd., are privileged to publish this instance, typical of many in which their products have been used with success in the belief that such authentic records will be of general interest.

Elastoplast elastic adhesive bandages are available in widths of 2", 2½", 3" and 4" × 5/6 yds. long when stretched. Also 2" wide × 1½ yds. (stretched). Elastoplast, Elastocrepe, Jelonet and Gypsona are products of T. J. Smith & Nephew, Ltd., Hull, England.

FERTIOL (VITAMIN E and all the other factors of Wheat Germ Oil)

Used in the treatment of habitual abortion, sterility of dietary origin and certain neuro-muscular degenerations.

Fertitol is a highly active natural and stable source of vitamin E and of the other factors of wheat germ oil. Each 5 minim capsule is standardised to contain 3 mg. α -tocopherol.

Wheat germ oil has given better clinical results¹ in some trials and shown properties additional to those of pure α -tocopherol.

1. Vogt-Moller, P., Tier. Rund., 1942, 48.

WOMEN AND THE CLIMACTERIC

For thousands of women who undertake heavy tasks through employment—and even in the home—muscular pains, backache and headache are the inevitable results of too-prolonged efforts.

This applies particularly to those subject to dysmenorrhoea and those approaching middle age and the climacteric.

Veganin gives most satisfactory results in such conditions since it is a synergistic association of codeine, acetylsalicylic acid and phenacetin, producing rapid and prolonged relief without ill effects. Veganin is not advertised to the public.



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A NEW ANTISEPTIC FLAVAZOLE

FLAVAZOLE is an equimolecular chemical combination of Proflavine base and Sulphathiazole synthesised in the laboratories of Boots Pure Drug Co., Ltd., Nottingham, England. Clinical results have shown Flavazole to be most effective against a wide range of bacteria when applied as a dusting powder diluted with a sulphonamide or when used as a neutral saturated solution (1:2,500).

Flavazole is available as follows:—

FLAVAZOLE

Bottle of 25 gm.

COMPOUND FLAVAZOLE POWDER

(Sterilized)

(Flavazole 2% Sulphathiazole 98%)

Carton containing 12 sifter packets
of 5 gm.

Bottle of 15 gm.

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FLZ. 1-355

A Method for the Arrest of Spreading Gas Gangrene by Oxygen Injection

HINTON says that the treatment of gas gangrene by injection of oxygen into the tissue, *per se* or through the use of hydrogen peroxide and the direct application of oxygen to the wound, is not new, but the use of measured amounts under controlled pressure and with aseptic technique, continued over a long period of time, was not possible under past methods.

The machine described here and the method of its use was brought to the author's attention when he had a case of gas gangrene of the forearm, secondary to compound fracture of both bones which in spite of gas serum before and after primary operation, secondary operation, amputation, penicillin and sulfa therapy, extended to the thorax.

By fortunate circumstance, a demonstrator of an oxinjector, who had supervised the injection of oxygen in 12 cases prior to this one, was in the hospital. Two patients with a similar condition of the upper extremity were recently seen, one involving the torso, making 15 cases in all, without mortality and in some instances without loss of limb.

Surgical treatment is to be used on all gas gangrene cases plus penicillin, etc., and oxygen injection is designed simply for the purpose of walling off the infected areas, preventing further spread and then aiding in the retrogression of the lesions. The addition of it to other treatment has in at least two of the cases been the difference between life and death.

The author describes the instrument and its operation and gives a detailed report of the aforementioned case, in which the oxygen was inserted through seven portals and eventually oxygen emphysema extended almost to the pubes. Only a small amount of oxygen rose above the clavicle and this produced difficulty in swallowing and talking. In less than 72 hours all discoloration had disappeared.

The author stresses that the described procedure is a controlled and scientific method of blocking the spread of gas bacillus infection of extremities and trunk, and is an adjuvant to proper surgery in gas gangrene.

(Hinton, D.: *Am. J. Surg.*, 73, 228, February 1947.)

Effect of Oestrogenic Hormone on Advanced Carcinoma of the Female Breast

THE favourable results obtained by some English investigators with oestrogenic hormones in women with advanced carcinoma induced Herrmann and his associates to try this procedure. They selected 17 patients, 13 of whom had primary inoperable cancer, which had not been treated before. Two patients had recurrent lesions. Of the remaining two patients one had a carcinomatous ulcer in the mastectomy scar and the other had recurrent nodules in the skin of the thoracic wall. A biopsy specimen which was positive for cancer was obtained in every case. These 17 patients were treated exclusively with a synthetic oestrogenic hormone (ethinyl oestradiol) administered orally. The dose of ethinyl oestradiol varied from 0.15 to 0.7 mg. daily.

There was a favourable response in seven, or 40 per cent of the patients, five with superficial lesions of the soft parts and two with pulmonary metastases. The favourable response occurred predominantly in women over 60 years. The dosages employed induced uterine bleeding, sometimes severe, in over 50 per cent of the patients. Vaginal smears were studied in six patients, all of whom showed a well developed oestrus reaction.

The authors stress that their experiences with the oestrogenic hormone treatment does not differ greatly from that reported by British authors in about 100 cases. An important point of agreement is that the favourable results are obtained predominantly in women above the age of 60. The results suggest that oestrogens have a decidedly deleterious effect on women

in the younger age group. This appeared to be most striking in a 40-year-old patient who was menstruating regularly. When first seen in the clinic her general condition was good despite the mass in the right breast and right axilla. Soon after the institution of the oestrogen therapy her condition deteriorated. Within three months she was bedridden, and she died about one month later.

(Herrmann, J. B., Adair, F. E., and Woodard Helen, Q.: *Arch. Surg.*, 54, 1-9, January 1947.)

Surgical Treatment of Bronchiectasis

THIS report is based on observations of the treatment of 390 patients with bronchiectasis during a three-year period. There were 220 consecutive lobectomies with only one death. One hundred and eighty-four lobectomies were performed for bronchiectasis, 20 for pulmonary cysts, 11 for chronic pulmonary suppuration, three for bronchial adenomas associated with suppuration, and two for basilar tuberculosis. Post-operative broncho-pleural fistulae and empyemata occurred in only 20 cases, an incidence of 9.7 per cent. Pulmonary function as determined by broncho-spirometric studies in a small group of patients pre- and post-operatively demonstrated that the oxygen consumption and ventilation within several months post-operatively were only slightly below normal values and in most cases either essentially the same or improved over pre-operative levels.

In no instance was the pulmonary function following an uneventful lobectomy significantly impaired, and it was shown that two to three months post-operatively pulmonary function on the operated side was within normal limits. The principal conclusion is that permanent cure in bronchiectasis can be attained only by pulmonary resection.

(Kay, Earle, B., and Meade, Richard, H., Jr., and Hughes, Felix, A., Jr.: *Surgical Treatment of Bronchiectasis. Ann. Int. Med.*, 26, 1, January 1947.)

Intermittent External Biliary Drainage for Relief of Pruritus in Certain Chronic Disorders of the Liver

VARCO points out that in certain chronic disorders of either the hepatic parenchyma or intrahepatic biliary system intractable itching is an unpleasant feature. These patients frequently suffer miserably from this unrelenting annoyance, and their generalized cutaneous excoriations attest to the transient or incomplete relief obtained through the therapy customarily employed. Dihydroergotamine, injected intramuscularly, will often control the pruritus for a short while, but is invariably followed with a return of the desire to scratch.

If the abnormal retention of bile salts is associated with or is the cause of the pruritus, then relief from the itching may be anticipated if it is possible to reduce this concentration in the circulation. A rational therapeutic approach; therefore, appeared to be the development of some method for the reduction of the serum bile salt level. Since from the total quantity of bile salts secreted each 24 hours, about 90 per cent is reabsorbed from the intestinal tract, recirculated through the liver, and then re-eliminated in the bile, a pre-enteric deviation of bile should theoretically eventually reduce the serum bile salt level. These conjectures have been translated into surgical procedures applied to clinical material, and it has been found that intermittent external biliary drainage suffices to attain and maintain prompt and virtually complete relief from this type of pruritus. Seven operations have been performed on six patients without fatality.

Small quantities of bile salts have been given orally upon three occasions to patients in this series during the time each had an external biliary fistula. Pruritus promptly returned and then disappeared with maintenance of the external biliary drainage.

In no instance has it proved necessary to develop a complete or even high-grade deviation of the bile in order to provide satisfactory surcease from the itching. Circuiting the bile to the outside for short intervals daily has sufficed to keep these persons comfortable. In all patients, chronic hepatic disease, either hepatitis or cirrhosis, has been pre-operative diagnosis, and this has been confirmed by the pathologic report of liver biopsies secured during the surgical procedure. It should be emphasized that pruritus associated with acute hepatitis is so frequently a self-limited disease, that any surgical procedure for its relief would seem unwarranted.

(Varco, R. L.: *Surgery*, 21, 43-45, January 1947.)

The following six items are reproduced from Medical Newsletter No. M-449, dated May 1947, prepared by the American Medical Association:—

Immersion Hypothermia

WAYBURN says that during the year 1944 approximately 150 men who had been immersed in waters of the North Sea were seen by medical officers at an Air Forces fighter station in England. A majority of the men showed no immediate effects from immersion other than temporary fatigue. Among 192 men picked up from various kinds of aircraft 163 survived. Of the 29 who died all but three were dead at the time of rescue. Those patients who suffered from such immersion on return to long combat flying missions are reported in detail.

Four of the patients had transient electrocardiographic abnormalities. One had abnormalities of blood chemistry. It was concluded that immersion hypothermia is a progressive clinical syndrome which may follow immersion in cold water. It is related to experimental hypothermia and to clinical shock. The clinical picture is the resultant of the coldness of the water, the length of the exposure, the emotional factors affecting the patient before and during exposure and the specific response of the person to cold. The chief effects are those on (a) the cardiovascular system (among the transient conditions observed were auricular fibrillation and flutter, ventricular extrasystoles, slight prolongation on the P-R interval and falling arterial blood pressure, with narrowing of the pulse pressure), (b) the nervous system (partial to complete loss of consciousness and irrational behaviour were observed) and (c) the blood (haemoconcentrations and notable hyperglycemia were found in one case).

Treatment consists in rapid restoration of normal body temperature by external heat, minimal activity, administration of warm fluids by mouth and, in severe conditions, use of blood plasma. No drugs were used in this series. Use of epinephrine is contra-indicated.

(Wayburn, Edgar: Immersion Hypothermia. *Arch. Int. Med.*, 79, 77, January 1947.)

Treatment of Lymphoblastic Leukemia with Crude Myelokentric Acid

EIGHT cases of blastic lymphoid leukemia have been treated with myelokentric acid in crude form, because hypothetically in blastic lymphoid leukemia there is a deficiency of this material. The crude myelokentric acid was used because it was more easily obtained than partially purified material. Purification of biologically active materials by methods of extraction and precipitation necessarily results in a considerable loss of material. Thirteen partial remissions occurred following the administration of crude myelokentric acid. Seven of the eight patients have died, and five necropsies were performed.

The necropsy material adds further weight to the belief that the remissions were induced by the myelokentric acid in that in all five necropsies there was a definite alteration in the histologic morphology as contrasted with the findings in the necropsies of the

controls. The authors concluded that it seems inadvisable to treat a large number of patients with this material because it is crude, it is relatively unavailable, and no standard dose has yet been devised.

(Miller, F. R., Herbut, P. A., and Jones, H. W.: The Treatment of Lymphoblastic Leukemia with Crude Myelokentric Acid. *Blood, The Journal of Hematology*, 11, 15, January 1947.)

Pathologic Changes from Streptomycin

THE authors employed 42 monkeys, 11 dogs, 350 rats, 100 mice, 10 chickens, and 154 guinea-pigs in their experiments aimed at studying the pathologic effects resulting from the administration of streptomycin. The parenteral administration of highly purified as well as average streptomycin samples resulted in fatty metamorphosis of the liver in monkeys and dogs.

Large doses of streptomycin concentrates produced small foci of necrosis in the livers of a few dogs. Fatty metamorphosis was observed less often in the kidneys of monkeys and dogs treated with streptomycin. Albuminous detritus appeared in the subcapsular spaces and the tubules of the kidney in some of the monkeys. Hyaline and granular casts, epithelial cells and occasionally blood cells were seen in the sediment of the centrifuged urine of dogs receiving large doses of streptomycin concentrates. Focal tubular necrosis occurred in the kidneys of one dog. The fatty change observed in the liver and the kidney was found to be reversible. It was not followed by permanent pathologic damage.

Complete studies of the blood of monkeys, dogs and rats treated by injection of streptomycin revealed as the only significant change slight normocytic anemia, which disappeared on cessation of dosage. Prolonged administration of streptomycin concentrates of average purity (230 to 310 micrograms of streptomycin base per milligram of solids) resulted in neurotoxic effects in dogs, manifested by disturbances of equilibrium and possibly of auditory acuity. Spontaneous recovery occurred in one animal.

No lesions which could explain these effects were evident in the limited material studied. Streptomycin samples of higher potency (640 to 710 micrograms of streptomycin base per milligram of solids) did not produce neurotoxic symptoms in dogs.

(Mushett, Charles W., and Martland, Harrison, S.: Pathologic Changes Resulting from the Administration of Streptomycin. *Arch. Path.*, 42, 619, December 1946.)

Urethane of B-Methyl Choline and Gastric Motility

THE subcutaneous administration of urethane of B-methyl choline in a post-vagotomy patient, who had marked gastric retention, led to a restoration of gastric peristalsis and motility, and relieved him of his epigastric distress, anorexia and nausea. Subsequently its oral and sublingual administration had a similar effect. A placebo was not equally effective. In another vagotomized patient, the parenteral administration of the drug induced sufficient gastric tonus and peristalsis, as well as pyloric relaxation to permit duodenal intubation, a procedure which was readily accomplished prior to vagotomy, but which was impossible during an 80-day post-vagotomy period without the use of the drug. The clinical effects of the drug in both of these patients were demonstrated roentgenologically and by means of balloon-kymographic records.

(Machella, Thomas F., et al.: The Restoration of Gastric Motility by Urethane of B-Methyl Choline after Section of the Vagus Nerves for Peptic Ulcer. *Gastroenterology*, 8, 36, January 1947.)

Fatal Coronary Artery Disease in Young Men

THE purpose of this report is to present a study of nine cases of fatal coronary artery disease in young men taken from the records of a single Army hospital.

These nine cases comprised 3.2 per cent of all autopsies, a total of 280, performed on men between 18 and 40 years of age. The nine cases comprised 7.4 per cent of all autopsies, a total of 121, performed on men between the ages of 18 and 40 years who died of natural causes. Very few of these nine young men gave evidence of having had symptoms of coronary disease before the fatal episode. Death was sudden and unheralded.

Most of the nine young men who died of coronary artery disease were of average or below average height. Cardiac weight did not reflect the seriousness of the cardiac condition. Slight to moderate enlargement of the liver may have been related to the cardiac disease. Evidence of old myocardial injury is frequent; evidence of fresh infarction is rare in young men dying of coronary artery disease.

(Poe, William D.: Fatal Coronary Artery Disease in Young Men. *Am. Heart J.*, **33**, 76, January 1947.)

Lancefield Groups of Beta-Hæmolytic Streptococci in Respiratory Infections

THIS investigation is part of a series on respiratory diseases conducted by The Commission on Acute Respiratory Diseases of the United States Army Preventive Medicine Service. In a large Army camp only 6 per cent of the patients with respiratory infections admitted to the hospital from an organization of new recruits were due to streptococcal infections. Bacteriologic and immunologic studies demonstrated that 90 per cent of the infections were due to group A, 4 per cent to group C and 3 per cent to group G. Clinical and epidemiologic evidence suggested that a few patients had infections due to groups B and F.

The illnesses produced by the various groups of beta-hæmolytic streptococci were similar. Streptolysin O antibodies were demonstrated in serum specimens obtained from patients harbouring organisms of groups A, C and G. Antifibrinolysin developed in patients with infections due to group A and group C streptococci. The titre of antifibrinolysin in the serum specimens taken during the acute and convalescent phases from patients with infections due to groups C and G was identical when measured with fibrinolysin prepared from organisms of groups A, C and G.

(The Commission on Acute Respiratory Diseases: The Role of Lancefield Groups of Beta-Hæmolytic Streptococci in Respiratory Infections. *New England J. Med.*, **236**, 157, 30th January, 1947.)

Maintaining Nitrogen Balance with Amino Acids

By M. L. SOENKE *et al.*

(Abstracted from the *American Practitioner*, Vol. I, January 1947, p. 276)

It was demonstrated that parenamine, acid hydrolysed casein fortified with 1 per cent di-tryptophane, is an adequate source of amino acids for the maintenance of nitrogen equilibrium. Two normal adults and two hospital patients were studied.

In the case of the two normal adults the average daily nitrogen retention was 0.61 gm. and 0.68 gm. when the nitrogen intake was 191 mg. and 211 mg. per kilogram of body weight, respectively. The caloric intake was 50 calories per kilogram for both cases.

A patient with ulcerative colitis was maintained in equilibrium by oral administration of parenamine. The average daily retention of nitrogen was 1.94 gm. when the daily nitrogen intake contained 273 mg. nitrogen and 58 calories per kilogram of body weight.

With adequate caloric intake, a diabetic woman was maintained in positive balance by oral and parenteral administration of parenamine.

These studies emphasize the necessity of an adequate caloric intake in order to maintain a positive nitrogen balance when amino acids are the sole source of nitrogen.

No attempt was made to use a basal level of either nitrogen or calories.

The Ageing Population

(From the *Medical Officer*, Vol. 77, 19th April, 1947. p. 160)

IN his final report as medical officer of health for Glossop after 27 years' service, Dr. E. H. M. Miligan draws attention to the ageing of the population. He writes: 'In 1921 the percentage of Glossop's population who were 65 years or over was 5.5, in 1931 the percentage had risen to 8.7. In 1921 the number of males was 492 and females 639; total 1,131. In 1931 the number of males was 644, females 1,103; total 1,747. If the census of 1941 had been taken, there is little doubt the percentage of old people would have been increased further. In the ten years ending 1912, 29.5 per cent of all deaths were those of persons of 65 years of age and over; for the 10 years ending 1939 the percentage dying at 65 years or over has risen to 58 per cent—just about double.'

Reactions from Intravenous Glucose

(From the *Medical Press*, Vol. 216, 18th December, 1946, p. 454)

THE occurrence of a reaction following intravenous glucose therapy using so-called pyrogen-free solutions is explained by Seibert. Pyrogens are chemical substances which are elaborated by bacteria; the latter may grow even in distilled water. Many species of bacteria may produce these substances, but the most common types are those found in river water. The name is derived from the fact that the substances produce febrile reactions when injected parenterally. Pyrogens pass through most bacterial filters, and are not activated by the heat applied in autoclaving solutions or equipment for parenteral treatment.

In the preparation of equipment for parenteral therapy two steps must be observed: (1) the equipment must be thoroughly washed with pyrogen-free solutions, such as distilled water that has recently passed through a proper still; and (2) the apparatus must be autoclaved within a few hours (approximately six) to destroy any bacteria which may have been introduced since the cleansing.

If a solution of dextrose is employed which was manufactured commercially and tested for pyrogens, and reaction follows, then the pyrogenic substances must result from imperfect preparation of rubber tubing and other apparatus. In such a case the pyrogens could be washed out by allowing the first 100 to 200 c.c. of the dextrose solution to be discharged through the apparatus and discarded before the injection into the patient is begun. The occurrence of pyrogens in the equipment for parenteral treatment is a strong argument for entrusting the preparation of such materials to a few specially trained personnel in a hospital.

Reaction to Oils and Fats

(Abstracted from the *British Medical Journal*, *i*, 29th March, 1947, p. 420)

Oils and fats are often deliberately introduced for therapeutic purposes by no means always with harmful results. Penicillin and other drugs are to-day administered in wax and vegetable oils, and for radiographic purposes iodized poppy-seed oil is introduced into the bronchus, apparently without any ill result, although

the oil remains for many months in the bronchi. On the other hand, mineral oils injected subcutaneously cause severe reactions, as many beauty-seekers know to their cost. Lanoline injected into the peritoneum produces a foreign-body-reaction tumour within a few days. And there is no doubt that the inhalation of mineral oils may induce severe and sometimes fatal reactions in the lung—a condition usually described as lipoid pneumonia. Many oily medicaments for treating sinusitis are on the market, and their use is probably wide. They are bland, as the rather eighteenth-century terminology has it, and cause no cough reflex. The majority of recorded cases of lipoid pneumonia have been, however, in patients who were very young, very old, comatose, or with paralysis of the muscles of deglutition. Paterson discovered 8 cases in 813 necropsies at University College Hospital, London, a surprisingly large number in view of the small total number in the literature. R. E. Rewell contributes in this number a further case, which is in many ways unusual. The patient was a previously healthy young woman, and there was no history of administration of oily substances in any form. There are undoubtedly cells containing macrophages in the alveoli, and these contain fat. The nodules in the spleen and liver are also most exceptional in lipoid pneumonia. As the author says, however, the case is a pretty problem in differential diagnosis. Some pathologists might prefer to look upon the condition as granulomatous and the lipoid-containing cells as representing the non-specific reaction, commonly seen in the lung, to which we have referred.

Though vegetable oils are inert in the human organism, it is well to remember that animal fats even of homologous origin cause foreign-body reaction. Mineral oils, being emulsified, are exceedingly dangerous in the wrong place and especially in the lung.

Plasma Mepacrine Reconsidered

(Abstracted from the *British Medical Journal*, 24th May, 1947, p. 728)

SULPHONAMIDES are distributed approximately equally through most of the body fluids and tissues. Mepacrine behaves quite differently since it has a high affinity for protein and for certain types of cells. Most of the mepacrine is stored in the tissues and only a small proportion is found in the blood. The concentration in the skin is approximately 80 times that of the blood, in the muscle 50 times and in the liver 2,000 times. In the blood itself distribution is uneven. The concentration in the erythrocytes is up to twice that of the plasma and in the leucocytes over 200 times. The concentration in whole blood is approximately four times as great as that in the plasma. Finally of the mepacrine in the plasma 80 to 90 per cent is bound to plasma proteins and 10 to 20 per cent is dissolved in plasma water; presumably it is this last fraction which is in equilibrium with the mepacrine in the tissues. In view of this complex distribution there was much discussion during the war as to which concentration of mepacrine—in plasma, in blood, or in some other fluid—was the most important. On the authority of Shannon and his colleagues it was generally agreed that plasma mepacrine was the most reliable indication of the level of mepacrine in the other tissues of the body. A great deal of work was done on this assumption, for example, the extensive observations made on volunteers at Fort Knox, and all aspects of the dosage of mepacrine and of its suppressive and therapeutic actions against malaria were related to plasma mepacrine levels.

The whole basis of this work has now been questioned in a recent paper by Marshall and Dearborn, working in the laboratory which launched 'blood concentrations' into modern therapeutics. They studied the therapeutic action of mepacrine in the malaria produced in ducks by *Plasmodium lophurae*, the host-parasite combination which has been most widely used in recent

American laboratory work on malaria. Ducks maintained on a constant daily dosage of mepacrine showed marked variations in the plasma concentration of mepacrine, both between different ducks and in the same duck on different days. These variations are due mainly to variations in the distribution ratio between plasma and tissues, most of the compound being stored in the latter. (Although not mentioned by Marshall, much of this variation might well be due to changes in the level of ammonium ions, since even low concentrations greatly influence the distribution of mepacrine between cells and body fluids.) The concentrations of mepacrine in the tissues and in the erythrocytes were much less variable than those of the plasma. There was little or no correlation between plasma concentration and therapeutic effect, but there was good correlation between dosage and therapeutic effect. Although this work has still to be confirmed, and it remains to be shown that what happens in ducks also happens in man, this paper calls for reconsideration of the basic assumptions of investigations on mepacrine. It does not invalidate all studies of the concentrations of drugs in body fluids; it merely points out that in the case of mepacrine the plasma concentration is not such a reliable indicator as was previously believed.

In that case there might be much to be said for going back to the estimation of its concentration in whole blood, taking precautions to check the leucocyte count. The whole blood concentration is much easier to measure than the concentration in the plasma, it can be done by a simple, portable, and cheap instrument described by King and Gilchrist. However, mepacrine is rapidly becoming out of date.

Pemphigus and Allied Conditions

By M. MICHAEL

(Abstracted from the *Acta Medica Orientalia*, Vol. 6, March 1947, p. 106)

(1) THE description of hitherto unknown forms of pemphigus and pemphigus-like skin eruptions may necessitate a new classification of pemphigus and diseases related to it.

(2) Experimental studies of the past 15 years, to some extent, lend support to the hypothesis of their production by a transmissible virus, as far as pemphigus and Dühring's disease are concerned. Further investigation will be necessary to elucidate the metabolic changes of the skin in pemphigus.

(3) Sulpha drugs and penicillin have, as a general rule, proved to be of but transitory effect in pemphigus and pemphigus-like diseases and their influence is probably confined to an effect on secondary infection.

(4) Favourable results in the treatment of pemphigus have been reported by several authors for large doses of vitamin D, the effect of which has not yet been satisfactorily explained.

Tuberculosis Mortality in World War II

By E. R. LONG

(From the *American Review of Tuberculosis*, January 1947, as abstracted in the *Journal of the American Medical Association*, Vol. 134, 3rd May, 1947, p. 18)

COMBINED figures from the office of the Surgeon-General and the Veterans Administration, representing the tuberculosis mortality of the entire army group, including its discharged members, are now available. This group, consisting of about 4 million men in 1942 and increasing to more than 11 million in 1945, had an average tuberculosis mortality of less than 4 per hundred thousand per year in 1942. The mortality increased to about 6 per hundred thousand per year in 1943 and to 10 in 1944. A slight rise was again evident in 1945, the last period for which figures are available, when the average mortality for members of

the existing army and discharged men and women who had served in the Army from 1942 to 1945 increased to 12 per hundred thousand per year. During this time the gross mortality rate for males of corresponding age in the United States fluctuated slightly but remained fairly constant at about 52 per hundred thousand population per year. The phenomenon observed is of great epidemiologic importance. A group with a relatively low tuberculosis mortality rate at the start, but with a certain percentage of unrecognized cases in its midst, has shown a significant rise in its rate within a period of four years, at a time when the mortality rate of the population from which it was drawn has remained practically constant.

Streptomycin

(Abstracted from the *Pharmaceutical Journal*, Vol. 158, 22nd March, 1947, p. 182)

THE Council on Pharmacy and Chemistry of the American Medical Association have accepted streptomycin for admission to 'New and Non-official Remedies'. It may be prepared in the form of salts, including the hydrochloride and sulphate salts. It is not a pure product but is marketed as a sterile powder in airtight ampoules or vials, the activity in terms of milligrams or grammes of pure streptomycin base being declared on the label. Streptomycin and its salts are reasonably stable, but should be stored at a temperature not in excess of 15°C. Solutions of streptomycin are less stable than the dry powder and should always be kept in the refrigerator. Only freshly prepared solutions should be used parenterally.

Streptomycin is useful in the treatment of urinary tract infections due to streptomycin-sensitive gram-negative organisms. In the presence of obstruction, streptomycin is of only temporary benefit, and successful therapy depends on correction of the underlying anatomic condition. *Pasteurella tularensis* is highly susceptible to streptomycin, and this agent is the most effective treatment for tularemia at present available. Influenzal meningitis due to various haemophilus organisms has been successfully treated with streptomycin, as have infections in other parts of the body. Wound infections, bacteraemias and other infections due to streptomycin-susceptible organisms may be treated with this agent. Experience with streptomycin in undulant fever, bacillary dysentery and typhoid has been disappointing, and failure has been the rule. Until further work elucidates the place of streptomycin in these infections, its use cannot be recommended.

Although streptomycin shows promising results in the therapy of tuberculosis infections in guinea-pigs, the clinical experience in human infections has not been sufficiently large to delineate its precise rôle in the control of human tuberculosis. At best it does not appear to offer more than limited usefulness as an adjunct to other forms of therapy.

The antibiotic is capable of producing side reactions of varying severity. Certain lots have been found which produce a histamine-like reaction on parenteral administration with a fall of blood pressure and syncope. This is due to some accompanying toxic material, and its occurrence is now rare. The most serious toxic effect, states N.N.R., is its neurotoxic action on the eighth nerve, which may occur in about 10 per cent of patients treated with large doses (3 to 4 gm. daily) over periods of several weeks to months. On cessation of therapy, partial recovery of eighth nerve function is the rule, although this recovery is slow, and vestibular function appears to be permanently impaired although compensation occurs. Minor toxic effects include skin rashes, mild malaise, muscular aching and drug fever.

For intramuscular injection, the powder should be dissolved in sterile, pyrogen-free distilled water or isotonic solution of sodium chloride to give a concentration of from 100 to 200 mg. of streptomycin base

per mil. For subcutaneous injection, more dilute solutions are recommended. If the drug is administered by intravenous drip, 1 to 2 gm. dissolved in a litre of isotonic solution of sodium chloride may be administered at a rate of about 25 drops per minute. For intrathecal administration, 10 to 20 mg. per mil. in isotonic sodium chloride solution should be used. For topical application, solutions containing 25 to 50 mg. per mil. may be used. It is recommended that the dosage be governed by the susceptibility of the organism responsible for the infection. In severe fulminating infections, doses of 2 to 4 gm. daily may be necessary, given in divided doses parenterally, every three hours. In less severe infections, and with highly susceptible organisms, daily doses of from 1 to 2 gm. may be sufficient. Treatment should be continued for at least forty-eight to seventy-two hours after the temperature returns to normal and all signs of infection have disappeared. It is pointed out that sufficiently large doses should be given to inhibit or kill the infective organisms quickly, since the development of 'fastness' to streptomycin is common and may occur rapidly. Inadequate dosage predisposes to the development of resistant strains of the organisms.

American manufacturers supply the sulphate and hydrochloride in vials containing the equivalent in activity of 1 gm. of streptomycin base, except that one manufacturer supplies the equivalent of 0.375 gm. of base.

Psoriasis

By J. TAS

(Abstracted from the *Acta Medica Orientalia*, Vol. 6, March 1947, p. 79)

1. A review is made of 380 cases of psoriasis registered, during the years 1920-1946, at the Dermatological Out-patient Clinic and Hospital Department of the Hadassah University Hospital in Jerusalem, with the aim in view to ascertain the effect of a hot climate on psoriasis and its incidence in Jews. Further, the difference was studied between the incidence in the more or less pigmented Oriental and the fair-complexioned European Jews.

2. The relative frequency (among other skin diseases of patients visiting the Out-patient Department) was 0.56 per cent on an average (minimum 0.27 per cent, in 1921; maximum 1.30 per cent in 1925).

3. Psoriasis was seven times as frequent among European (Ashkenazic) Jews as among Oriental and Shephardic Jews. As the latter groups are more or less pigmented this may confirm the view that psoriasis occurs with lesser frequency in pigmented people. It should be noted that patients of Oriental extraction constitute about half of our patients in Jerusalem.

4. The low relative frequency of psoriasis in Palestine, as compared to 3 to 7 per cent in Europe where also lay the countries of origin of half of our Jerusalem and the vast majority of the Tel Aviv and Haifa patients, indicates that a number of immigrants from European countries have lost their psoriasis in Palestine. Equally it might be supposed that a number of children, born in Palestine but from European parents, have been spared.

5. The Palestinian climate does not prevent the outbreak of psoriasis.

Ninety out of 142 patients got their psoriasis with or after immigration. Moreover, the proportion of Palestinian-born patients is considerable (106 out of a total of 380).

6. It appears that the majority of the patients come from European countries or have European parentage.

7. No specific predilection for the Jewish race could be established.

8. The distribution of age was the following:

First quartile: males 20.2, females 12.5; median: males 24.5, females 19.4; third quartile: males 34.1, females 28.2.

9. No differences in the sexes could be established.
10. No definite influence of the seasons was found.
11. The clinical picture was in no way different from that encountered in European countries.

Uses and Abuses of the Male Sex Hormone

By W. O. THOMPSON

(Abstracted from the *Journal of the American Medical Association*, Vol. 132, 28th September, 1946, p. 185)

In order to carry out treatment with male sex hormone intelligently, it is necessary to bear in mind certain fundamental considerations. The use of this material represents substitution therapy, whereas the use of various gonadotropins represents stimulation therapy. The testis contains two structures which have different functions although their functions are related. The seminiferous tubules produce spermatozoa while the interstitial cells of Leydig produce male sex hormone.

The testis may fail because of some defect in the testis itself (primary hypogonadism) or because of lack of adequate stimulation, notably by the anterior lobe of the pituitary (secondary hypogonadism). There is a close relationship between the functions of the pituitary and the gonads. The follicle-stimulating material produced by the anterior lobe of the pituitary influences the function of the seminiferous tubules, while the luteinizing material stimulates the interstitial cells of the testis to produce male sex hormone. The hormone thus produced inhibits the pituitary so that a delicate balance exists.

Three types of gonadotropins are available; pituitary gonadotropin from the pituitary itself; equine gonadotropin from the serum of the pregnant mare, and chorionic gonadotropin from the urine of pregnant women. Pituitary and equine gonadotropin are theoretically desirable because they contain both follicles stimulating and luteinizing material, but in the male they are not particularly effective. Chorionic gonadotropin is decidedly effective for stimulation therapy. It is luteinizing material and stimulates the production of male sex hormone, but it has little effect on the seminiferous tubules.

Testosterone propionate is a potent therapeutic agent and its use is indicated chiefly in cases of primary hypogonadism in the male, namely, those in which the defect is in the testis itself. Its most important uses are in the treatment of the following conditions:—

Eunuchism.—The most clear-cut indication for the use of the male sex hormone is in patients showing loss of both testes.

If a person loses his testes at an early age, it is probably desirable to delay treatment with the male sex hormone until the tenth to the twelfth year of age; namely, the age at which puberty normally sets in. Treatment should then be given continuously for the rest of the patient's life. It is important not to delay treatment beyond this age, because the presence of hypogonadism during puberty results in skeletal disproportions, notably a short trunk and long extremities and a tendency to narrow shoulders and knock knees.

Primary eunuchoidism.—Eunuchoidism represents partial loss of testicular function, which may vary from a slight deficiency to almost complete loss of function. It is commonly but not necessarily associated with bilateral intra-abdominal cryptorchism. Eunuchoidism may be primary or secondary in type, the secondary variety being the result of lack of adequate stimulation by the anterior lobe of the pituitary. The two types can be differentiated chemically by determination of the follicle-stimulating hormone in the urine. When present in normal or increased amounts, it indicates that the stimulating mechanism in the pituitary is normal, but the testes are unable to respond. The two types may be differentiated therapeutically by the administration of chorionic gonadotropin in a dose of 500 to 1,000 international units three times a week by intramuscular injection. If the genitalia develop, it

may be assumed that the testes are capable of responding to stimulation and that the stimulating mechanism is inadequate.

Treatment of eunuchoidism is similar to that of eunuchism. In particular, it is important to begin treatment with male sex hormone at the age when puberty normally sets in. Since the condition is secondary in a considerable number of cases, it is probably best to use stimulation therapy with chorionic gonadotropin first and then resort to treatment with testosterone propionate if improvement fails to occur or does not become maximum.

In the treatment of the Fröhlich syndrome and undescended testes, the administration of testosterone propionate is not indicated unless both testes are in the abdomen and incapable of responding to stimulation. This state of affairs does not often obtain in the Fröhlich syndrome. The male sex hormone inhibits the normal testis and if given in large doses may cause azoospermia. It is therefore desirable to use stimulation therapy whenever the testis is capable of responding. Glandular treatment in the Fröhlich syndrome should be started at the age at which puberty normally sets in and continued until epiphyseal closure occurs.

The treatment of undescended testes should be started by the age of 3 years. Glandular therapy should be continued until moderate genital growth takes place. If descent has not occurred by this time, the testes should be brought into the scrotum by surgical intervention.

Pituitary dwarfism.—The male sex hormone is a potent stimulator of growth. In young boys receiving it for undescended testes and the Fröhlich syndrome, the growth in height is greatly accelerated and bone age increases rapidly. It is not a substitute for the growth factor of the pituitary or for the thyroid hormone, and without these substances the skeleton cannot attain normal height. Because of its growth-promoting properties, it is of some value in treating patients with pituitary dwarfism, in order to make sure that the growth associated with puberty takes place. There is no particularly effective commercial preparation of the growth factor of the pituitary available at the present time. The male sex hormone should be used in pituitary dwarfism only if both testes are in the abdominal cavity and incapable of responding to chorionic gonadotropin and this is not often the case in pituitary dwarfs. In almost all instances chorionic gonadotropin is the material of choice. Treatment with chorionic gonadotropin and male sex hormone should not be started in pituitary dwarfs until about the twelfth year. If it is started much earlier the bones may age rapidly and epiphyseal closure may set in before the skeleton has had an opportunity to derive the benefits of whatever growth might take place without the intervention of the male sex hormone.

Male climacteric.—In some men the production of male sex hormone falls off as they grow older. The decrease in production is sometimes great enough to produce definite symptoms, such as hot flushes, nervousness, irritability, palpitation, a decrease in mental acuity and physical stamina and other symptoms similar to those of the menopause in the woman. It is important not to conclude that every old man who is tired is suffering from the male climacteric. This diagnosis should be made only after the most careful search has been carried out to discover some other cause for the symptoms.

Impotence from glandular causes.—Impotence is a symptom and not a disease. It may, of course, be associated with hypogonadism in varying degrees, and it is then rather promptly relieved by the administration of male sex hormone or chorionic gonadotropin, whichever is indicated. It is often psychogenic or neurogenic in origin, and when this is the case glandular therapy is ineffective.

Cushing's syndrome.—The use of the male sex hormone has been recommended in Cushing's syndrome because it promotes the retention of nitrogen. It seems to be of some value in those patients who show a negative nitrogen balance.



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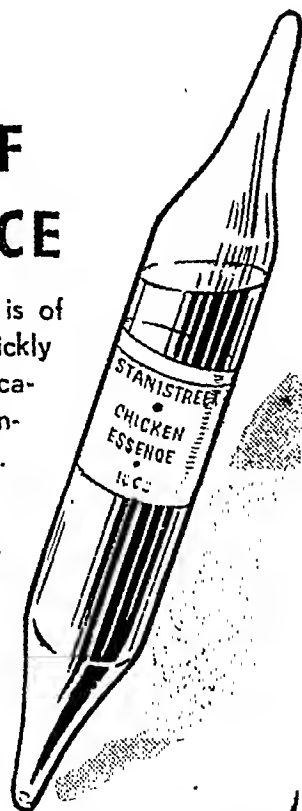
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Addison's disease.—In many patients with Addison's disease, there is loss of all functions of the adrenal cortex, including the production of androgen. Such patients are rather listless and peopless even after adequate treatment with adrenal cortex extract or desoxycorticosterone acetate. In men the lack of adequate development of secondary sex characteristics is also observed. The beard is usually deficient, and there is usually little hair on the abdomen, chest, arms or legs, while in the axillary and pubic areas the hair is often scanty. The administration of testosterone propionate in men in addition to adrenal cortex extract or desoxycorticosterone produces more improvement than specific therapy alone.

Hypopituitarism with secondary hypogonadism in old men.—In patients with hypopituitarism, notably those with chromophobe adenomas, secondary hypogonadism is usually observed, and this is often associated with secondary hypothyroidism and occasionally with secondary hypofunction of the adrenal cortex. In men with this disorder chorionic gonadotropin or male sex hormone may be an important adjunct to therapy. In older men whose testicular function is waning it may be necessary to use male sex hormone rather than chorionic gonadotropin.

METHOD OF ADMINISTRATION

Three methods of administering the male sex hormone have been employed:—

1. Parenteral administration of testosterone propionate in oil. A dose of 25 mg. three times a week by intramuscular injection seems to produce a maximum effect in almost all cases.

2. Oral administration of methyltestosterone in a dose of 30 to 60 mg. daily.

3. The implantation of pellets.

Parenteral administration of testosterone propionate appears to be the method of choice. Oral administration of methyl testosterone produces most of the changes outlined above but is not as effective as parenteral administration. Pellets have not been used extensively, and there are not enough data on their use to warrant definite conclusions.

ABUSES OF THE MALE SEX HORMONE

The male sex hormone is of no value or is contraindicated in the following conditions: (1) sterility; (2) benign prostatic hypertrophy; (3) carcinoma of the prostate; (4) the Fröhlich syndrome with one or both testes in the scrotum; (5) undescended testes unless there is no response or an inadequate response to chorionic gonadotropin; (6) impotence which is not glandular in origin, and (7) old age complicated with arteriosclerotic or hypertensive heart disease.

Improvement from male sex hormone has been claimed in the following conditions, although the data are not extensive enough to warrant definite conclusions: (1) angina pectoris; (2) various menstrual disorders in the female including menorrhagia, metrorrhagia and dysmenorrhoea; (3) carcinoma of the ovaries, and (4) carcinoma of the breasts.

The administration of the male sex hormone may produce the following harmful effects: (1) injury to the normal testis with production of azoospermia: recovery from such injury usually follows the cessation of treatment; (2) symptoms of heart failure in old men; (3) pitting oedema of the lower legs; (4) acne vulgaris; (5) hypermetabolism (large doses), and (6) hypertrichosis, lowering of the pitch of the voice and enlargement of the clitoris in women.

Treatment of Postherpetic Pain

(Abstracted from the *Journal of the American Medical Association*, Vol. 133, 8th March, 1947, p. 733)

The treatment of chronic postherpetic pain is usually unsatisfactory. Before radical therapy is advised, the

following measures may be tried in the order recommended: (1) posterior pituitary injection once or twice in twenty-four hours, (2) quinine hydrochloride as tolerated, (3) two intravenous injections of sodium salicylate, (4) 150 mg. of thiamine hydrochloride hypodermically three times a week for at least four weeks and (5) cobra snake venom.

If these measures fail, the patient should be referred to a neurologic surgeon, who may do a root resection on the side of the involved area.

Reviews

AIDS TO MEDICAL DIAGNOSIS.—By G. E. Frederick Sutton, M.C., M.D. (Lond.), M.R.C.P. Sixth Edition. 1946. Baillière, Tindall and Cox, London. Pp. viii plus 308. Illustrated. Price, 6s.

THIS booklet in its various editions has been the backbone of the students' morale. That it takes a great man to write a small book has been exemplified by its authors.

The present edition is one of the best and includes the latest developments in medicine such as Rh, electroencephalography and atypical pneumonia.

Perhaps the best section deals with the nervous system and forms nearly a third of the whole.

The only serious omission appears to be the serological diagnosis of atypical anaemia (pp. 141-142) and the only obscurity concerns the age incidence of rheumatoid arthritis and osteoarthritis (p. 288).

The book can be safely recommended to the student and the busy practitioner who has not been able to follow up the recent developments in medicine due to the War and its aftermath.

The get-up is of the usual Aids series, the paper being a trifle thinner than usual, in keeping with the shortage.

S. D. S. G.

THE ESSENTIALS OF MATERIA MEDICA, PHARMACOLOGY AND THERAPEUTICS.—By R. H. Micks, M.D., F.R.C.P.I. Fourth Edition. 1947. J. and A. Churchill Limited, London. Pp. x plus 399. Price, 18s.

THE new edition of this very useful book is welcome. The author's aim in writing the book, as mentioned in the preface, 'has been to meet the requirements of students and practitioners more exactly than other textbooks by referring only to those drugs which are of real therapeutic value and presenting the information about them in such a way as to make the task of learning it as easy as possible'. In revising 'two aims have been kept in view—the exposition of the principles which govern the action of therapeutically important drugs and the guidance of the physician in their administration'. Within the limits set out by the author, he has signally succeeded in writing a book whose rational view-point, concise description and precise direction of administration of remedies make it very pleasant reading and easy to remember. Opinions regarding what are therapeutically important drugs will obviously differ for therapeutics is still an art rather than a science and some may consider that the book does not contain enough 'essential' materials for medical students appearing in Pharmacology and Materia Medica examinations of the Universities and other Medical Faculties. Many may not agree with the view about the decomposition products of haemoglobin on p. 204; Benadryl mentioned in the text has not been indexed. These are minor blemishes in an otherwise very useful and dependable book for practitioners and students appearing in therapeutics.

J. C. G.

AN INTRODUCTION TO DERMATOLOGY.—Formerly by Norman Walker, Kt., M.D., LL.D., F.R.C.P., and G. H. Percival, M.D., Ph.D., F.R.C.P.E., D.P.H. Eleventh edition, 1947, by G. H. Percival. E. and S. Livingstone Limited, Edinburgh. Pp. xii plus 349. Illustrated (mostly in colours). Price, 35s. Postage, 9d. (Home)

It is a treat to find Norman Walker's Introduction to Dermatology having another edition, the eleventh. This was the book which introduced me and some of my colleagues to the study of dermatology.

In the present edition the book has been reduced in size and many recent informations given; this is as it should be. But in this edition we miss badly Norman Walker's easy flow of words and story-like description of the diseases which made his book so popular to the beginners.

The chapters on the erythematous eruptions and the eczema are well written, well illustrated and instructive. But the chapters on avitaminosis and tropical skin diseases are disappointing.

The publishers deserve congratulations for the paper, printing, coloured plates and the get-up of the book.

L. M. G.

THE TREATMENT OF DIABETES MELLITUS.—By E. P. Joslin, A.M., M.D., Sc.D., H. F. Root, M.D., P. White, M.D., A. Marble, A.M., M.D., and C. C. Bailey, M.D. Eighth Edition. 1946. Henry Kimpton, London. Pp. 861. Illustrated. Price, 50s.

We welcome the eighth edition of Prof. Joslin's extremely illuminating monograph, which presents to us most interesting records concerning 29,000 diabetics over a period of 48 years . . . the biggest achievement which any single author could produce in his lifetime.

A new and a very interesting chapter has rightly been devoted to 'Alloxan' diabetes, which can be produced in experimental animals by the injection of a chemical 'Alloxan' with almost unbelievable specificity. Alloxan is the ureide of mesoxalic acid and can be produced by oxidation of uric acid or from barbituric acid and is a colourless powder easily soluble in water or alcohol. It has been shown to have a specific destructive action of the Beta cells of the islands of Langerhans and experimental diabetes in animals can be produced slowly or suddenly according to the dose given. This new discovery appears to us to be a very important one from the point of view of research work in experimental diabetes, mainly because it is so easy to perform and also because it has several distinct advantages over the other and older methods such as pancreatectomy or injections of crude pituitary extract.

The book is a mine of useful informations, being the product of Prof. Joslin's life-long and intensive study devoted to the problem of diabetes. It is recognized as a classical work and a standard book of reference particularly from the point of view of statistics, physiology and pathology of diabetes. The amount of important, useful and up-to-date observations made within its pages is amazing. It is a *vademecum* which we feel sure will prove to be a valuable book of reference for those engaged in the study of the subject.

J. P. B.

A MANUAL OF TOMOGRAPHY.—By M. Weinbren, B.Sc., M.R.C.S., L.R.C.P., F.F.R., D.M.R.E. 1946. H. K. Lewis and Company, Limited, London. Pp. viii plus 270. Illustrated. Price, 45s.

TOMOGRAPHY is one of the more recent developments of radiology. By a co-ordinated movement consisting of the x-ray tube, rotating on its axis, and the x-ray cassette moving in an opposite direction on a variable fulcrum, skiagrams can be taken concentrating on certain layers of the body with the blurring out of the layers above and below. In this way certain conditions can be demonstrated which otherwise are overlapped by other structures, and therefore more or less obliterated.

Dr. Weinbren has succeeded admirably in bringing out the value of tomography in a large number of conditions. In the lungs the demonstration of cavities whose outline may be occluded more or less by surrounding fibrosis is very well demonstrated. In one striking case the author shows up very clearly a peripheral emphysematous bulla being the cause of a recurrent spontaneous pneumothorax.

In the section on the chest there is a very interesting account of the tomography of various cardiac conditions.

An excellent chapter is devoted to the tomography of the spine, in which the author demonstrates very clearly by this method many conditions missed at routine radiography. One of those is the demonstration of a large secondary carcinomatous deposit in a vertebra, not seen in the ordinary skiagrams.

The section on the skull and facial bones gives an excellent account of the valuable information that can be obtained of the petrous bone and of injuries of the facial bones. The latter particularly are often overlooked owing to overlapping by other structures.

An interesting section deals with dislocations and fractures of the condyloid process of the mandible in examinations of the temporo-mandibular joint.

A miscellaneous section at the end of the book shows the value of tomography of a large number of conditions where it is desirable to see changes at a certain depth of the tissues. An interesting case is included here where a cholecystogram showed apparently normal appearances in the gall bladder, whereas tomography revealed a calculus.

An account is given of tomography of the larynx, which certainly does give some information to the clinician.

The concluding chapter of the book gives a clear and concise account of the technique used by the author.

This book is a most welcome addition to the library of any serious radiologist. The whole production is excellent, and the skiagrams illustrating it are admirably reproduced.

S. G. G.

AIDS TO QUALITATIVE INORGANIC ANALYSIS.—By R. G. Austin, B.Sc., F.R.I.C., F.R.M.S. Second Edition. 1947. Baillière, Tindall and Cox, London. Pp. xii plus 207, with 9 figures. Price, 5s.

This book is of great help to the student starting his university career. Identifying unknown inorganic radicals present in mixtures and compounds has been made easy for him.

The concise and pithy way of putting all the procedures in the separation of the various groups and sub-groups and the characteristic tests for all radicals given side by side dispel confusion and raise the morale of the young chemist.

The pocket size and good printing are attractive and the price is not unreasonable.

B. C. D.

ADVICE TO THE EXPECTANT MOTHER ON THE CARE OF HER HEALTH AND THAT OF HER CHILD.—By F. J. Browne, M.D., D.Sc., F.R.C.S.E., F.R.C.O.G. Eighth Edition. 1947. E. and S. Livingstone Limited, Edinburgh. Pp. 50. Price, 9d. Postage, 3d. (Home)

The book is in its eighth edition and written with the object of helping the mother in the care of herself and her unborn and born baby. Dr. Browne has justified his objective by putting forth his ideas in an easy and popular language that will appeal to the mothers. He is clear in his various practical suggestions.

The pregnant mother will get many solutions of her daily experiences which look like problems to her. Thus she will get both physical and mental comfort by following the advice given in the book. Questions on minor ailments, which form a major part of pre-natal clinic work, have been answered clearly. This will help

the mother to understand the advice of her doctor and nurse. The same thing applies to the infant care also. Dr. Browne's experience is reflected in all the simple practical guidance he has given to the mothers.

Not being voluminous it encourages one to read. Printing is in decent type which makes easy reading. The popularity of the book is demonstrated by the various editions it has gone through. The present one has been made up to date by incorporating the latest ideas on maternal health. One would like to see this book on the book-shelf of every home.

M. S.

MOTHERCRAFT IN THE TROPICS.—By Kennie Macpherson. 1947. Cassell and Company, Limited, London. Pp. xiv plus 205. Price, 6s.

THE author of the book has had first hand experience of the Tropics. It seems to have been written with the object of helping the Western mothers who come to live in the Tropics. For us who have been born and brought up in the Tropical soil, some of the problems mentioned seem to be a little exaggerated. None the less it will be able to guide many mothers coming to live under the new conditions.

The contents would have been more befitting the title, and would have been within the capacities of mothers if so much space had not been given to diseases and other topics of a technical nature. Some statements like the ones on feeding and immunity seem to be a little exaggerated and not quite correct.

The advice on the selection and the management of ayahs is a useful chapter. The stress laid on the need for regular medical examination is an encouraging one.

The book has been got up in a very attractive form and in bold type. Hence it is easy reading. The writing is in fairly popular language, and many practical points are given from the author's personal experience.

M. S.

CHILD HEALTH AND DEVELOPMENT.—By Various Authors. Edited by Richard W. B. Ellis, O.B.E., M.D., F.R.C.P. 1947. J. and A. Churchill Limited, London. Pp. viii plus 364. Illustrated. Price, 18s.

CHILD Health and Development is a book that will be very much appreciated by the Maternity and Child Welfare workers. The book gives the recent concepts of child health and development in its various fields. This helps the reader to save time and gain knowledge without having to refer to too many books. It is written in a way that will help the doctors, health visitors and others who have taken interest in this branch of preventive medicine.

Though the main subject of interest is the child, the subject of Maternity and Child Welfare has been considered as a continuous service in this book. This emphasizes the place and importance of the mother and her health in the care of her child. The stress on the need for considering the child as a living, thinking, and feeling being, with his own individual personality will impress all those who read the book. Social aspects of Child Health have also not been neglected. This is in keeping with the credit the book gets as being a modern one. The second part describes the relationship of social services to child care, along with the organization that exists at present. This will help many in planning Maternity and Child Welfare programmes.

The book has been nicely got up and in quite good print. It should find a place on the bookshelf of all those who are either interested or working in the field of Maternity and Child Welfare.

M. S.

THE CARE OF CHILDREN—FROM ONE TO FIVE.—By John Gibbens, M.B. (Camb.), F.R.C.P. (Lond.). Third Edition. 1947. J. and A. Churchill Limited, London. Pp. vii plus 192. Illustrated. Price, 5s.

THIS book supplements the book on care of babies by the same author. The two together give a conti-

uous picture of the citizen as he starts life and begins to understand and gets himself adjusted to his environment. It is intended for mothers and also for people who are interested in children and want to help them to grow up to the best of their capabilities. Mothers consider many small things as serious problems and they feel helpless and depressed when they cannot help their children. This book will give them many practical and easy suggestions in understanding children.

Training in good habits and showing co-operation in solving the child's day-to-day problems is essential at this age. Also as the child is more independent he is exposed to more hazards. Dr. Gibbens gives considerable importance to both these needs and tells us how to keep him busy and use his unlimited energy in a constructive way. The book will help the mothers to give the best they can to the children with whatever limited resources they have. Child Welfare workers will be able to get many hints as to the right approach to mothers, in language and thought that will appeal to them most.

The book is composed in an attractive and easy form. The illustrations are quite catching. It should be a popular book among all those who have to deal with children in one way or other.

M. S.

THE CARE OF YOUNG BABIES.—By John Gibbens, M.B. (Cambridge), M.R.C.P. (Lond.). Second Edition. 1946. J. and A. Churchill Limited, London. Pp. viii plus 200, with 7 plates and 7 text-figures. Price, 5s.

IN a popular language and in a practical way this book deals with babies. As mothers get more and more educated and the family gets smaller and smaller in our society, they want to know more and more about their babies. They want to give their best. The book will give them considerable practical hints for this purpose.

Starting with a note on the care during pre-natal period and then a word to the fathers, the book goes on to consider the babies, their needs and problems. At this period feeding causes anxiety to mothers in various ways and the section devoted to that subject has been adequate. The book will help her not only when the child is well, but will give her practical suggestions which she could easily carry out when the child is ill. Mothers should find this a helpful book and child welfare workers an easy guide for proper approach to the mothers.

It is a well got-up book with very attractive illustrations. Easy to read and easy to handle. Deserves to become a popular book among all those who want to know about babies and want to help them to grow up as useful and happy citizens of the nation.

M. S.

THE LOUSE. AN ACCOUNT OF THE LICE WHICH INFEST MAN, THEIR MEDICAL IMPORTANCE AND CONTROL.—By Patrick A. Buxton, C.M.G., F.R.S. Second Edition. 1947. Edward Arnold and Co., London. Pp. ix plus 164, with 47 figures and 9 tables. Price, 10s. 6d.

THE second edition of Prof. Buxton's book has been thoroughly revised and some chapters have been rewritten. The author has produced a treatise on the louse giving a comprehensive account of the subject.

The first two chapters deal with general biology and external and internal anatomy of the insect. The individual and collective biology is described in two separate sections. The relation of lice to relapsing fever, typhus and trench fever has been fully gone into, and up-to-date information of the development of rickettsia and spirochaeta in the louse together with short comparative descriptions of murine typhus and the tick-borne relapsing fevers has also been incorporated. The chapter on louse control has been rewritten and all the methods of delousing have been adequately described. A chapter on Phthirus and an appendix on the technique of rearing lice for experi-

mental purposes conclude the book. The illustrations are excellent.

D. N. R.

RECENT ADVANCES IN CLINICAL PATHOLOGY.—

Edited by S. C. Dyke, D.M. (Oxon.), F.R.C.P. (Lond.). 1947. J. and A. Churchill Limited, London. Pp. xii plus 468, with 34 plates and 19 text-figures. Price, 25s.

THE World War II brought together in England a number of clinical pathologists from Europe. They pooled their experience and wrote this book which is, thus, unique in conception and execution.

All recent additions to the subject of clinical pathology are included, e.g. Atypical Pneumonia (with details of serological diagnosis), Anaerobic Infections, Rh Factor, Blood Chemistry in Diseases of the Alimentary Tract, Semen Examination (histological and chemical), Biopsy (with observations on histological details which are by no means final) and Haematology (with observations on its recently acquired top-heaviness).

The only obscurity noted by the reviewer concerns the serological diagnosis of atypical pneumonia: it is not clear whether the agglutination titre is given by the *initial* or the *ultimate* dilution. It is given really by the initial dilution.

The index could have been fuller: semen which has been dealt with very well in the book is not found in the index.

The book is a very useful addition to the medical laboratory workers' literature. The get-up is compatible with the post-war dearth of paper, etc., and the price is reasonable.

S. D. S. G.

MEDICAL DISORDERS OF THE LOCOMOTOR SYSTEM INCLUDING THE RHEUMATIC DISEASES.—

By Ernest Fletcher, M.A., M.D. (Cantab.), M.R.C.P. E. and S. Livingstone Ltd., Edinburgh. Pp. xii plus 625, illustrated. Price, 45s.

THIS book deals in a comprehensive manner with all disorders of movements other than those arising from diseases of the nervous system.

Applied anatomy and physiology, radiography, laboratory findings and the author's system of examination are well described. Nine contributors have written special sections.

Although the bulk of the book deals with chronic rheumatism, rheumatoid arthritis, osteoarthritis and fibrositis, rare diseases like the 'marble bone' are also included. The classification followed is that of the Royal College of Physicians, London.

The treatment includes all up-to-date measures, physical, medical and surgical.

The paper, printing and binding are good. No printer's errors attract attention. The price is not unreasonable.

S. D. S. G.

BOOKS RECEIVED

1. Immunity Bulletin. Incorporating the Proceedings of the Immunity Scientific Association. Synopsis of Researches at the Bengal Immunity Laboratory, Calcutta. May 1945 to April 1946. Published by Dr. T. N. Ghosh, D.Sc., and Dr. A. N. Bose, M.A., Joint Secretaries, Immunity Scientific Association, Bengal Immunity Research Laboratory, Barnagore, Calcutta.

2. Sri Ramakrishna Math Charitable Dispensary, Brodie's Road, Mylapore, Madras. Report for the year 1946. Issued by the President, Sri Ramakrishna Math and Mission, Mylapore, Madras.

ERRATUM

In the *Indian Medical Gazette*, 82, No. 8, August 1947, p. 500, column 2,

for 'Practice of Medicine (written in Bengali). By Dr. Jotindra Nath Ghosal, L.M.S. Parts I and II. Published by B. Ghosal, 83, Karbala Tank Lane, Calcutta. Pp. 336. Price, Rs. 9 (in paper)'

read 'Practice of Medicine (written in Bengali). By Dr. Jotindra Nath Ghosal, L.M.S. Parts I and II. Published by B. Ghosal, 83, Karbala Tank Lane, Calcutta. Pp. 692 (12 plus 336 plus 2 plus 336 plus 6). Price. Rs. 9 (in paper)'.

Abstracts from Reports

REPORT OF THE SCIENTIFIC ADVISORY BOARD, INDIAN RESEARCH FUND ASSOCIATION, 1946

THESE researches were carried out in various centres and many of them are still in progress. In the following summary only matters of general interest are referred to:—

Cholera.—Owing to its low incidence there was not enough opportunity to test the value of sulphadiazine in treatment. A chemical compound of sulphanilamide and formalin, designated 'FSA PPT', is being worked out for treatment of the disease; it has a more marked bacteriostatic, though not selective, action on the vibrios than sulphaguanidine or sulphasuxidine.

Malaria.—Work on D.D.T. continues. From certain field trials it is concluded that (1) indoor residual spraying is the most effective method against mosquitoes and (2) for residual spraying, emulsions (oil in water) and suspensions (in water) containing 2.5 per cent D.D.T. and applied at the rate of 2 c.c. per square foot are highly effective. Enquiry on mammalian malaria has so far shown no evidence of the existence of exo-erythrocytic cycle. **Nutrition.**—The effect of including khesari gram (*Lathyrus sativus*) in diets containing adequate quantities of vitamins was

that guinea-pigs did not grow and developed certain toxic symptoms suggesting toxic effects. In another experiment done elsewhere the addition of this cereal (30 per cent) in the diet of pigeons seemed to show a distinct tendency towards the development of lathyrism but this was mitigated to a certain extent by the administration of vitamin A. The clinical features of riboflavin deficiency were found in Madras not only in the mouth, tongue and eyes but also manifested as fissure, proctitis, angular blepharitis and preputial ulceration. Phrynoderma was found more often related to vitamin B complex deficiency, responding well to a combination of yeast extract and linseed oil. 'Burning feet' was relieved by marmite and injection of calcium pantothenate and not by thiamine, nicotinic acid and riboflavin. The vitamin A content of shark liver oil obtained from various places in India has been found to vary considerably. The kernel of coconut has 8.27 per cent crude protein but is poor in many vitamins. It has been proved that with the increase of nitrogenous manures the protein content of rice also rises much above the normal value. The mineral and vitamin contents of such rice are being estimated. A study of the effect of strain and environmental factors has shown that the nutrition value of some cereals and pulses is greatly influenced by the genetic nature of

the strain and emphasizes the need for new strains as a step forward towards the development of nutrition of this country. Peels from oranges and citrus fruits were found to be exceptionally rich in carotene. Experiments with soya bean continue and many leafy vegetables are being analysed for their vitamin content. Investigations are proceeding on fat metabolism, food supplements, value of food protein in the regeneration of blood and of plasma proteins, etc. A note is appended to the report on vanaspathi or hydrogenated vegetable oil which, though more or less devoid of vitamins A and D, appears to have good nutritional value, but its melting point should not exceed 38°C., otherwise the digestibility and absorption decreases. Further researches on it are needed. In the practical field Bombay Government has taken various steps, viz, supply of groundnut cake atta at cheap rates (this can be mixed with ordinary wheat atta for making chapattis), extension of milk scheme, preparation of vitamin A concentrates from shark liver oil, sale of vegetables through Government shops and extension of community feeding and canteens in industry. Work in Madras has included free mid-day meals for school children, free milk supply to priority consumers, etc. In Hyderabad-Deccan a mobile canteen scheme is in operation with demonstration kitchens and supply of balanced nutritious meals at cost price. *Leprosy*.—The sulphone drugs, promine and diosone, are being tried. Most patients have shown clinical improvement but have not been bacteriologically negative. In a few treatment had to be discontinued because they could not stand it. Attempts are being made to get streptomycin and try it in this disease. A study of about 2,000 cases of leprosy showed, contrary to general belief, that it was rare to find lepra bacilli in the nose in the absence of bacilli in the skin. *Plague*.—Experiments with DDT on rat fleas are being continued. It is noted that plague vaccine grown in casein hydrolysate is more potent and has greater virulence than agar-grown vaccine. *Clinical*.—B levels were determined and found to show a significantly lower range in oral cancer than in healthy people. In the acute stage of naga sore fusiform bacilli were found constantly in enormous numbers; they seem to be of aetiological importance. Typical ulcers could be produced in human volunteers by intradermal inoculation of the pus. A survey of some estates showed that the affected people were mostly engaged in outdoor work and the ulcers were due to the trauma of the lower extremities. In many there was history of trauma at the site of ulcers; in others vesicles or papules appeared spontaneously with itching. Insects probably played no part in the causation of the disease. Its incidence was related to rains only in some cases, and while occurring sporadically in one tea garden, it may occur in epidemic form in a contiguous one for no apparent reason. Blood proteins in healthy people, in certain tropical diseases and in persons suffering from malnutrition were studied, and emphasis is given in the report of frequency with which severe hypoproteinaemia has been induced by the restriction of diet under medical advice, a condition which can be restored to normal by liberal feeding alone with no special medicinal treatment. In the treatment of hypoproteinaemia the oral administration of protein appears to be the best method of treatment when patients are able to take diet by mouth. A study of the anatomy of foot by making cross sections at various levels showed some additional fascial spaces besides the known ones; this may help to get a clear understanding of the infection in foot and leg. Investigations are proceeding on the rôle of nutritional factors in hepatic cirrhosis and on the aetiology and treatment of infantile cirrhosis. A survey by the newly constituted dental research unit revealed a low incidence of dental caries and a very high incidence of parodontal diseases in Ajmer-Merwara province and that endemic fluorosis is common in many parts of the Punjab. Some investigations were also carried out by the unit on dental dystrophies in infantile scurvy and parodontal diseases. An enquiry into the causes of blindness shows that it is preventable in at least 38 per cent of cases. *Pharmacology*.—Some

are being studied. *Maternal and* enquiry is being made on the bearing of premature and immature births on infant mortality. *Filaria*.—Study of the action of antimony compounds, stibatin and anthiomaline was continued. *Other researches*.—These were on folic acid on macrocytic anaemia, filtrable viruses, serological diagnosis of typhus fever, manufacture of penicillin, etc.

R. N. C.

Old Tales Re-told With Fresh Comments

OLD CALCUTTA (1759-1763)

By C. CLEGHORN

(From 'Selections from Unpublished Records of Government for the years 1748-1767 inclusive'. By the Rev. J. Long, member of the Govt. Record Commission, Vol. 1, 1869, Office of the Superintendent of Govt. Printing, Calcutta, 1869)

Servant's wages

THE following is quoted from proceedings of the 21st May, 1759 :—

Taking into consideration the united complaints of the inhabitants (of Calcutta) with respect not only to the insolence but exorbitant wages exacted by the menial servants, and having duly weighed and considered the premises, we are of opinion that their complaints are too justly founded and loudly call for redress. That a rate of monthly wages be established according to the underwritten lists of servants in private service.

	Rs. As. P.		Rs. As. P.
Consumah		Peon	
Head cook		Bearers	2 8 0
Coachman	5 0 0	Washerman ..	3 0 0
Female servant		Molly ..	2 0 0
Sycc		Grass cutter ..	1 4 0
Mussalchee or torch bearer.	2 0 0	Wet nurse	4 0 0
Barber ..	1 8 0	Dry nurse	
Jemadar ..	4 0 0	House tailor ..	4 0 0
Khedmutgar		Harry wench or woman to a family ..	2 0 0
Cook's mate	3 0 0	Harry wench to a single man	1 0 0
Head bearer			

Scarcity of grain

A Government note dated the 20th July, 1761, states :—

The scarcity of grain in the place (Calcutta) being at present such as to distress the poorer sort of people in the greatest degree, in order therefore to relieve the wants of the poor, the Board propose sending a sum of money to the markets in the country for the purchase of a quantity to be sold at an easy rate.

[It will be observed that the exaction was followed by the scarcity of grain, not unlike what is happening at the present time. It was a man-made scarcity. Obviously the establishment of the wages in 1759 was not rigid enough.—EDITOR, I.M.G.]

Correspondence

ABORTION BY MEDICAL PROFESSION

SIR,—The mass migration resulting due to the division of India has not left the medical profession unconcerned.

The threat of the epidemics and heavy casualties resulting by the madness seizing the population in Punjab, has no doubt called for the utilization of all the available means with the Directorate of Health Services.

But this is not all. The abduction of innocent womenfolk of opposite communities and their being rendered *enceinte* presents an angle which has not only socio-religious bearing but its medical aspect too. What should be the position of such women who have been subjected to such brutal experience of course against their wishes? In a letter to the *Hindustan Times*, New Delhi, a plea has been made that abortion should be undertaken by the medical profession with justification and I hope others too agree with me that such a step is justified and necessary.

Perhaps I will do well to cite as a parallel to such an action the case of Dr. Alec Bourne a leading Harley Street specialist in Obstetrics and Gynaecology who on seeing a case of a young girl of 14 years of age becoming pregnant after being raped by soldiers decided to do an abortion on his own judgment considering the grave consequence were the pregnancy allowed to go to full term. Dr. Bourne informed the police authorities in advance of the time and place and his intention to abort the girl. The police arrested him and in the trial that followed Dr. Bourne was not only honourably acquitted but the magistrate complemented him for his judgment and foresight. The medical profession therefore need have no qualms in resorting to such a step in suitable cases.

I am, etc.,

One of the Medical Profession.

[We agree. See editorial.—EDITOR, I.M.G.]

OLDEST MEDICAL MONTHLY OF THE EASTERN HEMISPHERE

SIR,—As a regular reader of your esteemed journal I want to draw your attention to a small error in your Editorial in the June 1947 issue (page 346), where under the heading 'The Twin Dominions and the Indian Medical Gazette' you state:

'The first number of this publication appeared in 1860. . . . This journal is the oldest medical monthly of the Eastern hemisphere. . . .'

Doubtless this is true as regards English-speaking countries in the Eastern hemisphere, but nevertheless, the 'Geneeskundig Tydschrift van Nederlandsch-Indië' (Medical Journal of the Netherlands Indies) is 9 years older than the *Indian Medical Gazette*. This periodical, issued at first bi-monthly, later monthly, and finally weekly, was edited regularly from 1851 till 1942; then came the Japanese occupation, whereby the journal was suspended. At present it is issued again as *Medisch Maandblad* (Medical Monthly).

Yours, etc.,

Ch. W. F. WINCKEL,
former Editor of the
Geneeskundig Tydschrift
voor Ned.-Indië.

AMSTERDAM Z,
DE LAIRESSESTRAAT 142,
10th October, 1947.

[The statement under objection is amended as follows:

The journal is the oldest medical monthly of the Eastern hemisphere, that has been issued regularly up to date since its commencement. . . .

Incidentally, the date of publication of the first number of this publication is 1856 and not 1860.

—EDITOR, I.M.G.]

STORAGE OF PENICILLIN

SIR,—With reference to the letter from Major Bouche which appeared in your issue for May 1947, and the editorial comment upon it, we would refer you to a more recent paper by Denston (*Quart. Journ. Pharm. and Pharmacol.*, 1946, XIX, 322). She studied the stability of solutions of penicillin at different temperatures and from which withdrawals were made at intervals to reproduce the storage conditions in practice of solutions of penicillin.

Penicillin 'Glaxo' as obtained in India has a high potency, usually at least 1,400 units per mg.; the following observations are based on material of such potency.

The majority of specimens stored at room temperature in Bombay (85°F.) show little appreciable loss after 6 months. An imperfect closure, resulting in access of moisture, will adversely affect the keeping properties.

It may therefore be said with some confidence that cold storage in hill stations is not necessary.

Penicillin solutions may be stored at room temperature up to 100°F. for 4 days without appreciable loss of activity. We suggest that estimates of keeping properties for longer periods are largely academic as solutions are seldom likely to be kept longer in medical practice.

Denston found that a solution of high potency penicillin of 100,000 units per mil. has 90 per cent of the original potency after five to six days whether stored in a refrigerator or at room temperature (70°F.). After ten to fourteen days in a refrigerator 85 per cent of the activity can be guaranteed.

We would draw attention to the apparent misprint in the second paragraph of the comment on penicillin powder, where 8°C. not 80°C. is surely intended.*

The statement that refrigerator temperature is 2°C. is a little misleading; the storage temperature in the ordinary domestic refrigerator is usually about 8°C.

Yours faithfully,

H. J. FOSTER & CO., LTD.

BOMBAY 1.

[*This printing error is regretted.—EDITOR, I.M.G.]

USE OF ANTICOAGULANTS IN THE TREATMENT OF EXPERIMENTAL YELLOW FEVER

SIR,—Almost 40 years ago Calmette (1908) noted that lesions resulting from the injection of viper venom 'Strangely resembled those observed in the case of individuals who have died from yellow fever'. Calmette further remarks that this observation was made by several scientists, notably Sanarelli, and that it had probably led Dyer and Bettineour 'to treat—without much success—yellow fever by the 'antitoxin of venom'.

It is not surprising that antivenene should be of little or no value in the treatment of yellow fever despite similarity in the pathology of the two conditions, for such sera are, of course, purely specific in action. Nevertheless, if the action of yellow fever virus resembles that of viper venom, it may be that a non-specific physiological antidote to venom will be of some value as an antidote to the action of the virus.

In heparin (and possibly dicoumarol) we have a physiological antidote to the venom of the Russell's viper (*daboia*), as recently shown by Ahuja and others (1946). On purely theoretical grounds unsubstantiated by any experimental work on our part, we suggest the use of these anticoagulants in the treatment of experimental yellow fever in animals.

We apologize for so speculative a theory, but as we are precluded from experimentation on yellow fever in India, we write in the hope that someone in a position

to conduct such work may see this letter and give the suggestion a trial.

Yours faithfully,
M. L. AHUJA,
LIEUTENANT-COLONEL, late I.M.S.,
Director, Central Research
Institute, Kasauli,
A. G. BROOKS,
Assistant Surgeon, I.M.D.

REFERENCES

- AHUJA, M. L., BROOKS, A. Note on the Action of Heparin on Russell's Viper Venom. *Ind. Jour. Med. Res.*, Vol. XXXIV, No. 2, Oct. 1946, pp. 317-322.
- CALMETTE, A. (1908) .. 'Venoms, Venomous Animals and Antivenomous Serum.' John Bale, Sons and Danielsson Ltd., London.

Any Questions

BLOOD AND PLASMA TRANSFUSIONS

SIR,—In the rural areas of Bengal it is practically impossible to practise blood transfusion in cases of severe blood loss and anaemia, because the facility of laboratory for grouping is not available.

Is it possible for us to practise plasma transfusion (dried plasma) instead of whole blood transfusion without the help of a laboratory? If so, please let me know the source of supply, technique and other details of the same, and also reference books if any on the subject.

Yours faithfully,
KAMALAPATI CHATTERJEE, L.M.F.

P. O. BHANDARJHI
(Dist. BURDWAN).

[Dried plasma is made up to the original potency according to the instructions sent with the bottle.

The Blood Bank, Calcutta, provides dried plasma. The Bank will also provide the other information you desire.

The work of blood transfusion and blood banks was discussed in the editorial of *I.M.G.*, August 1947.—
EDITOR, *I.M.G.*]

Service Notes

APPOINTMENTS AND TRANSFERS

In view of the partition of the province, Lieutenant-Colonel E. G. Montgomery, who has chosen to serve in East Bengal, is transferred in the interest of public service as Surgeon-General, Dacca, with effect from the 15th August, 1947.

The services of Major F. M. Khan, Port Health Officer, Calcutta, are placed at the disposal of the Government of Bengal, with effect from the 24th June, 1947, for appointment as Director of Public Health, Bengal.

Major F. W. Allinson, Surgeon-Superintendent, Presidency General Hospital, Calcutta, is appointed to be Professor of Surgery, Dacca Medical College.

Major J. W. D. Goodall, Professor of Clinical Medicine, Medical College, Calcutta, is appointed as Civil Surgeon, Dacca, vice Dr. Md. Refatullah.

The Secretary of State for India has appointed to the Indian Medical Service (Civil) the following officers of the Indian Medical Service with effect from the dates noted against their names:—

External Affairs and Political Departments

Captain T. P. Binns. Dated 25th August, 1943.
Major D. P. Dewe. Dated 24th May, 1946.

Health Department

Major M. S. Chadha. Dated 9th May, 1945.
Captain P. J. Wormald. Dated 1st September, 1945.
Major B. S. Khurana. Dated 12th October, 1945.
Major P. M. Kaul. Dated 24th January, 1946.
Captain K. D. Fraser. Dated 24th May, 1946.

Assam

Captain J. R. Kerr. Dated 21st December, 1945.
Captain J. Lightbody. Dated 7th April, 1946.

Bengal

Major K. N. Rao. Dated 26th March, 1946.
Major A. V. O'Brien. Dated 17th May, 1946.

LEAVE

Major W. J. Virjin, Principal, Dacca Medical College, is granted leave for 8 months with effect from the 1st August, 1947.

Colonel L. K. Ledger, C.I.E., O.B.E., Inspector-General of Civil Hospitals, C.P. and Berar, granted leave on average pay for 8 months combined with leave on half-average pay for 9 months and 1 day with effect from 11th August, 1947, preparatory to retirement.

Lieutenant-Colonel A. S. Garewal, Inspector-General of Prisons, C.P. and Berar, is appointed to hold the charge of the office of the Inspector-General of Civil Hospitals, C.P. and Berar—*cum*—Director of Public Health, C.P. and Berar, in addition to his own duties with effect from 11th August, 1947, forenoon.

Lieutenant-Colonel C. H. Dhala, now on training at the Presidency Jail, is allowed leave for 4 months with effect from the 12th August, 1947.

Lieutenant-Colonel D. Kelly, Civil Surgeon, Chhindwara, is granted leave on average pay for 8 months combined with leave on half-average pay for 20 months preparatory to retirement with effect from 14th August, 1947, forenoon.

Colonel D. Clyde, C.I.E., V.R.S., Surgeon-General with the Government of Bengal, is granted leave for 3 months with effect from the 15th August, 1947.

Lieutenant-Colonel C. L. Pasricha, Director, School of Tropical Medicine, Calcutta, is granted leave for 4 months with effect from the 15th August, 1947.

Major A. T. Andreasen, Professor of Surgery, Medical College, Calcutta, is granted leave for 28 months with effect from the 15th August, 1947.

Major V. M. Albuquerque, O.B.E., Medical Planning Officer, is granted leave for 6 weeks with effect from the 15th August, 1947.

Lieutenant-Colonel E. A. R. Ardeshir, whole-time Superintendent and Medical Officer, Presidency Jail, is allowed leave for 4 months with effect from the 26th August, 1947.

Lieutenant-Colonel B. Choudhury, O.B.E., Deputy Inspector-General of Prisons, West Bengal (Security), is allowed leave for 8 months with effect from the 26th August, 1947.

Lieutenant-Colonel M. A. Singh, Inspector-General of Prisons, West Bengal, is allowed leave for 4 months and 15 days with effect from the 26th August, 1947.

PROMOTIONS

Majors to be Lieutenant-Colonels

G. K. Graham. Dated 3rd August, 1947.
P. L. O'Neill. Dated 5th August, 1947.

Captains to be Majors

W. H. A. Thorne, O.B.E. Dated 1st May, 1947.
C. C. Harvey. Dated 1st July, 1947.
R. J. McGill. Dated 1st July, 1947.
H. N. Sen Gupta. Dated 12th July, 1947.
N. Jungalwala, O.B.E. Dated 1st August, 1947.

RELINQUISHMENTS

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Lieutenant-Colonel:—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Ty. Lieutenant-Colonel T. M. Mathew. Dated 22nd April, 1947.

Major R. B. Sule, Medical Adviser (Pensions) (D.A.D.M.S.), Defence Department (Pensions Branch), relinquished the appointment. Dated 8th June, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major:—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Major N. S. Pillay. Dated 11th August, 1946.

Captain K. Mariswamappa. Dated 12th April, 1947.

Major S. Mascarenhas. Dated 21st April, 1947.

Ty. Major P. Ray. Dated 2nd May, 1947.

Ty. Major C. Joseph. Dated 26th May, 1947.

Major C. R. Mannadiar. Dated 6th June, 1947.

Major H. M. Kalapesi. Dated 7th June, 1947.

Major A. Kidvai. Dated 12th June, 1947.

Major N. K. Roy. Dated 26th August, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are placed at the disposal of the Government of Punjab with effect from the date specified:—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Major Akhtar Hussain Hamid. Dated 3rd April, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of Assam with effect from the dates specified:—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain Pramendra Nath Bhattacharjee. Dated 9th April, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are placed at the disposal of the Government of United Provinces with effect from the date specified:—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain Bisheshwar Dayal. Dated 15th April, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of Madras with effect from the date specified:—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain Akkana Pragada Rama Mohan Rao. Dated 14th June, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain:—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain K. S. Sarangapani. Dated 31st August, 1946.

Captain G. Singh. Dated 26th November, 1946.

Captain A. N. De. Dated 18th December, 1946.

Captain A. Mukherjee. Dated 11th January, 1947.

Captain M. Jogarayan. Dated 19th January, 1947.

Captain K. C. Dobhal. Dated 2nd April, 1947.

Captain E. Bheemasankaran. Dated 13th April, 1947.

Captain J. J. Poorvattil. Dated 5th May, 1947.

Captain H. D. Messiahdas. Dated 7th May, 1947.

Captain B. K. Rao. Dated 22nd May, 1947.

Captain K. A. Rao. Dated 23rd May, 1947.

Captain N. K. Shroff. Dated 10th June, 1947.

Captain T. V. N. Nambiar. Dated 20th June, 1947.

Captain G. Singh. Dated 22nd June, 1947.

Captain A. Sen Gupta. Dated 26th June, 1947.

Captain M. Swaminathan. Dated 26th June, 1947.

Captain M. Ismail. Dated 30th June, 1947.

INDIAN MEDICAL SERVICE

SECONDED TO THE INDIAN ARMY MEDICAL CORPS

*(Emergency Commissions)**(WOMEN'S BRANCH)*

Captain (Mrs.) Winifred Agnes Fernandez (*née* Vaz). Dated 1st May, 1946.

Captain (Miss) J. B. Hakim. Dated 29th October, 1946.

Captain (Mrs.) Lucy Achamma Kuruvilla (*née* Verghese). Dated 17th February, 1947.

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Original Articles

REITER'S DISEASE

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Introduction.—Differential diagnosis in medicine is emphasized primarily to ascertain the correct diagnosis so that correct treatment can be initiated. In conditions simulating venereal diseases the differential diagnosis has an added importance in that an incorrect diagnosis may lead not only to faulty treatment but also to much unnecessary mental distress to the patient as well as to his friends because of the stigma associated with venereal diseases. Gonorrhœa is one of the commoner VD's, and gonorrhœal urethritis complicated by poly-arthritis or bilateral conjunctivitis or both is not an uncommon clinical condition. Any other clinical condition giving a similar picture should therefore be well known so that a wrong diagnosis of VD does not add mental pain to the bodily pain of the disease. Reiter's disease is such a condition.

Literature.—Reiter (1916) first described the condition in a German officer aged 28 who was observed in a field hospital for thirteen weeks. The officer was not recently exposed to infection. On 21st August, 1916, he had lower abdominal pain followed by bloody diarrhœa. On 29th August, 1916, there appeared purulent urethritis and bilateral purulent conjunctivitis. On the next day an occasional joint was affected. During the 13 weeks in hospital the patient often had high temperature and delirium, and altogether had a severe illness. This severity of the illness is important to remember for the later cases have not been severe. At the time of discharge the officer was not materially improved. Reiter found a spirochæte from the blood of the patient, but this observation has not been repeated by any one else.

Reiter (1917) wrote again and was soon followed by others, mostly from Germany and Scandinavia. Cases were also reported from France and West Africa, 1916, 1917 (Editorial, 1946) and then a lull followed. Vallee (1946) referred to 151 cases, and Touraine and Ruel (1946) considered that 300 cases had been reported in the literature. They also called the condition 'pseudo-gonococcal enteritis' while Sargent (1945) proposed the term 'idiopathic blennorrhœal arthritis'. During the recent war years cases have been reported more frequently in British journals and the *British Medical Journal* (7th December, 1946) gives a review in editorial columns. The condition has not yet been

reported in this country and this paper includes four case records.

The clinical picture is characterized by a triad of urethritis, bilateral conjunctivitis, and arthritis. Pyrexia of varying degree is nearly always present. The pain of gonococcal urethritis is generally not seen, and hæmaturia has been infrequently reported. The case is generally seen in men, probably because women with such complaints care less to come forward for treatment. Associated features are iritis, scleritis, keratitis, keratoderma blennorrhagica, neutrophil leucocytosis to a moderate degree, general lymphadenitis, and raised erythrocyte sedimentation rate. Though earlier cases were linked with venery (Kristjansen, 1930), modern opinion (Editorial, *loc. cit.*) holds that there is no relationship to sexual intercourse. The conjunctivitis is purulent or muco-purulent, and is generally bilateral. Arthritis affects all joints though the larger more frequently. There is often fluid in the joints and the clinical picture is sometimes like that of rheumatic fever, except that the case is not so ill as in rheumatic fever. Epstein (1939) has thought that keratoderma blennorrhagica is part of the same illness. The disease may run its course without all the components of the main triad being present at the same time (Jackson, 1946). The disease if long drawn is self-limited. A mild hypochromic anæmia is part of the picture as would be expected from the toxæmia and the pyrexia; recurrence is a marked feature.

Case records.—The first case was seen in a male Chinese day-labourer aged 34, who was admitted into hospital in 1934 for purulent urethritis and bilateral purulent conjunctivitis. Exposure to venery was admitted three weeks ago and the first symptoms appeared 17 days later. There was discomfort but not actual pain on micturation, grittiness in the eyes, and slight general malaise. It was the fear of gonorrhœa that impelled the man to seek admission. The provisional diagnosis was gonococcal urethritis followed by contact or hæmatogenous conjunctivitis. Gonorrhœa was rife in the area and also in the particular class the man came from.

The standard treatment for gonorrhœa in the particular clinic at that time consisted of strict rest in bed, large amounts of fluid by mouth, mild alkalization of the urine for 72 hours, a low protein diet, camphor mono-bromide at night to prevent erections which would be painful, bi-weekly injections of 5 c.c. of 5 per cent trypaflavine intravenously, and symptomatic treatment for complications. The conjunctivitis in this case was treated with washes of 1 in 8,000 solution of oxycyanide of mercury. Irrigation of the urethra was rarely advised. While this accepted line of treatment was instituted in the case, the consistently negative findings for gonococci in the many specimens taken from the urethral and conjunctival discharge, as well as from the urine nullified the provisional

diagnosis of gonococcal infection. The diagnosis was made only later after reference to the literature.

For the first four days the treatment was attended with success in that the eyes cleared up completely and the urethral discharge was less. But on the fifth day the patient developed arthritis, one joint after another being involved and the affection apparently moving from joint to joint as in rheumatic fever. The urethral discharge waxed and waned and together with the flitting arthritis kept the patient in hospital for nearly three months. Syphilis had in the meantime been excluded, and the treatment was essentially symptomatic. A course of mixed vaccine produced little benefit, and ultimately the patient recovered after six bouts of hyperpyrexia produced by intravenous injections of Dmelcos. It was not claimed at the time, nor is it claimed now, that the Dmelcos was either specific or necessarily curative in the case. At the time of discharge the man was free of all symptoms and the joints allowed free movement.

Complement-fixation test was not done, but the large number of smears producing the negative results left no doubt that gonococci were not associated with the case. In spite of the length of the illness, the man was never very ill, and the highest recorded temperature was 103°F. once, and generally it was of the order of 100°F.

The second case was seen in a British Army officer in India in 1938. The man was 29 and had within the month previous been exposed to VD but he had taken all precautions. His presenting feature was arthritis of the right knee joint, but it was the onset of urethritis two days later that was the real reason for calling in the doctor. The story of the man if to be believed *in toto* meant that gonorrhœa was unlikely in view of the precautions taken, and yet there was no other obvious diagnosis. The eyes were affected two days later by a mildly purulent conjunctivitis and the case remained in hospital for eight weeks, though not always confined to the bed. The patient was never very ill; the other joints affected were the left wrist and the right foot. Gonococci were not demonstrated in spite of many examinations of the various exudates. The WR and the Kahn test were negative, and the urethritis was only anterior as judged by the three glass test. The leucocyte count was 12,500 with 73 per cent neutrophils. The pyrexia was only mild and the patient was more inconvenienced than ill. When discharged after eight weeks he was fully cured and has since served with an active regiment under diverse conditions and has remained perfectly fit. He was fit and active in 1945, obviously fully cured.

The third case was seen in an Indian soldier in Palestine. This man had never exposed himself to venereal diseases and he had had no dysentery during the three years of his service, one of which was spent in Palestine. The onset was sudden following an unusually hard day's

work. An itchy sensation was noted in the urethra for a few hours and taken little notice of. The next day there was slight malaise and in the evening there was noticed for the first time a little whitish discharge from the urethra. The patient began to suffer more from a sense of shame which he felt than from the actual illness. For the first three or four days it was impossible to assure him that he was not suffering from gonorrhœa; in fact members of the staff themselves were not satisfied that it was really not gonorrhœa. With sulphapyridine in the usual standard doses the urethritis improved, and even as it did, arthritis appeared. The right knee, the right ankle, and the left elbow were affected in rapid succession. There were swelling, warmth, pain, tenderness, and limitation of movement in all the joints. There was also slight bilateral conjunctivitis for five days, three days after admission. This feature did not become very prominent perhaps because the patient was receiving sulfapyridine at the time. In addition the eyes were washed with mild antiseptics. That the condition was not due to a gonococcal infection was certain, for the large number of specimens from the urethral and conjunctival discharge were negative for gonococci. The possibility of a chemical urethritis was carefully excluded. Once the joints were affected the treatment was suitably modified and the patient was in hospital for just over five weeks. The hæmoglobin came down from normal to 10.8 grammes per cent, rbc to 3.8 millions, and the wbc count varied from 11,000 to 13,000 with eosinophils varying from 5 to 9 per cent. This was a mild eosinophilia but is mentioned because this has not been noted in any of the other cases, and because the patient was not infested or infected with any parasites, to explain the finding. The complement-fixation test for gonococci was negative, and the WR and the Kahn test done twice were also negative. At the time of discharge the patient was well except for the mild anæmia and a faint stiffness in the joints affected. After a month in a convalescent depot the man was quite normal.

The striking feature of the case was the intense sense of shame from which the man suffered for a time, and to make matters worse people continued to joke about the affair for some time. This had to be stopped by orders, though later everyone knew that venery was not responsible for the illness.

The fourth case was a Bengali Muslim who was sent back from Malaya for a persistent urethritis and polyarthritis. He had been treated with sulfa drugs and also with 560,000 units of penicillin without result. He had denied exposure to venereal diseases but the clinical condition was too much like gonorrhœa for the treatment not to have been given. Gonococci were not found whilst overseas and repeated tests in India were also negative. On arrival in India the man was bedridden because of the joint affections but the urethral discharge

was quite minimal. Conjunctivitis was not noted in India but the field medical unit notes said 'Mild reddening of the eyes with slight discharge'. This was apparently treated though the notes said nothing more. The patient corroborated that eye washes were given. In view of the absence of gonococci and a negative WR and Kahn, Reiter's disease was diagnosed. Sepsis elsewhere in the body was excluded, and the fluid from the right knee joint was sterile. The x-ray pictures of the joints were normal. It is interesting to remember that other reports of cases also noted that there was no bony abnormality, and none made any specific reference to the synovial membrane. This patient remained in this hospital for over four months making a total stay in hospital for nearly six months. The treatment here consisted of physiotherapy, good dieting and nursing, careful diversional therapy, and another course of 800,000 units of penicillin. The net result was stoppage of the urethral discharge and some improvement in the general condition. But the progress was on the whole unsatisfactory. A mild hypochromic anaemia had developed, and after the second course of penicillin there was a fine scaly eruption in the soles of both feet. This was not actively treated and caused the patient little or no discomfort. Loss of weight was marked on arrival in India but was successfully countered by correct feeding. Specific enquiries were made about dysentery but any infection was denied by the patient.

Finally hyperthermia was produced by a series of intravenous injections of TAB vaccine, the actual doses given being 25, 25, 50, 50, and 100, and 250 millions of the standard vaccine intravenously, and other treatment such as careful nursing and diversional therapy were continued. Physiotherapy was continued and the patient made slow but steady recovery. On discharge he was, apart from the vague stiffness of the joints, quite fit and after another six months wrote to say that he was fit but thought that he had lost much of his manhood. He was then lost sight of because of demobilization.

Etiology.—The cause of the disease is still unknown nor is it clear whether this is a separate disease entity or is merely a syndrome which can be produced by a number of causal factors. The neutrophil leucocytosis, the pyrexia, the response to sulfa drugs and penicillin, and the similarity to other infectious diseases are all in favour of the condition being an infective process. But no one organism has been found in the exudates of the cases; in fact most of the cases showed sterile exudates. The original finding by Reiter (1916) of the 'spirochæte forans' has not been confirmed by any later finding of a similar organism from any of the other cases reported so far. A number of writers (Editorial, 1946) has correlated the disease with bacillary dysentery and Reiter's first case was associated with bloody diarrhoea; Jackson (1946) has, however, reported

cases which were in no way connected with bacillary dysentery. None of the cases in the present series was associated with bacillary dysentery. A strong argument against bacillary dysentery being a necessary causal factor in the production of Reiter's disease is the fact that while bacillary dysentery is very common in India, Reiter's disease is very uncommon.

In two of the three cases reported by Stühmer (1921) and in three of Sommer's (1918) cases no organism was detected, though it was considered that the urethral infection was the primary condition and the affection of the eyes and the joints secondary. Wrigley's (1946) case was associated with sepsis in one ear and an abscess in one calf, but no specific organism was isolated. Junghanns's (1918) case was associated with a furuncle in the upper lip and the case was considered part of a general septic process. Frühwald (1927) described two cases in one of which the onset was with urethritis and in the other with joint pains; here too no specific organisms were shown. In all these cases not only was no specific organism found, but what is more important still was the fact that gonococci were absent. The complement fixation wherever done was consistently negative for gonococci.

A virus infection is a possibility and Harkness (1945) claims to have demonstrated inclusion bodies in the exudates in five of his cases. This observation awaits confirmation.

Allergy as a causative factor has been hinted at by Denfield (1946) who observed cases in West Africans. He found that it required more than one and often several attacks of gonorrhoea to provoke an attack of Reiter's disease, and once provoked subsequent attacks of gonorrhoea made the Reiter's disease worse. The absence of eosinophilia is rather against allergy, though in the present series a mild eosinophilia was seen in one case. On the other hand the case described by Forbes (1946) was obviously linked with dental sepsis, and allergy as a result of bacterial infection is a well-known phenomenon. Some of the other cases mentioned above also show an allergic possibility. The cases reported as correlated with bacillary dysentery were probably allergic in nature, and in this sense a correlation may be accepted. The whole condition may therefore be considered to be a bacterial sensitization caused by a number of bacteria which may not be allied to one another, and it may be precipitated by one or more attacks by the bacteria.

Pathology and differential diagnosis.—The clinical features make the pathological condition clear. Gonorrhoea is the most important disease to be differentiated. For this, examination of the exudate at various stages of the disease is necessary. With modern technique the consistently negative result for gonococci must be taken to mean that gonococci are absent. With the triad mentioned above present in full and gonococci absent, the diagnosis is Reiter's

disease. The absence of one of the components of the triad may cause difficulty in diagnosis, but the absence of gonococci should settle matters.

A rash with fever and joint pains may be mistaken for secondary syphilis, but syphilis does not cause urethritis, and the WR and the Kahn test will be positive.

The flitting pains in the joints together with fever may remind one of rheumatic fever, but the latter does not cause urethritis. Other conditions to be differentiated are non-specific urethritis, gout, prostatitis of non-gonorrhoeal origin, and the various forms of arthritis and conjunctivitis.

Waelsch (1904) has described a type of illness 'chronic non-gonorrhoeic urethritis of type Waelsch'; in this there is a long incubation period as in Reiter's disease and there are no organisms in the urethral discharge, but there occur posterior urethritis and prostatitis, and Waelsch has not described any hæmatogenous metastatic complication in his cases.

Treatment.—The exact ætiology of the condition being unknown, treatment must necessarily be symptomatic. Miller and McIntyre (1945) feel that good nursing in bed is all that can be done. This view is rather pessimistic, especially in view of the reported success with penicillin by Baxter (1946) and with sulphathiazole by Jackson (1946). Protein shock therapy has been tried by Beiglboeck (1943). One of the cases in the present series was also treated similarly, with apparent success. Fieldsend (1946) used neoarsphenamine in his cases and though he called his cases 'abacterial pyuria presenting as urethritis' it is very probable that at least two of the cases were of Reiter's disease. The response to this arsenic preparation was certain and prompt.

The diet need not be restricted, and as the stay in hospital is very long, some form of diversional therapy is indicated. For the joints the co-operation of a physiotherapist is useful, and if the general health has suffered, ultra-violet radiation is helpful.

The conjunctivitis needs nothing more than a simple eye lotion and the instillation of penicillin is an added adjunct. The keratoderma clears by itself when the general condition improves but it may help the patient to use some form of mild antiseptic to prevent secondary sepsis.

Artificially induced hyperthermia has obviously a field here as evidenced by some of the cases mentioned above. It is best produced by a Kettering hypertherm or a similar appliance.

The secondary anæmia needs no special treatment as it disappears as soon as the main condition improves.

Even if the case is not correctly diagnosed as Reiter's disease, and is treated as gonococcal infection by sulfa drugs or penicillin, nothing but good can result, and as such, and also in view of the reported success with these two drugs,

they should always be tried. Neoarsphenamine is also worthy of trial after these two.

The importance of good nursing is to be stressed, and there should of course be close liaison with the physiotherapist.

The sociological problem connected with venereal diseases comes in here also. It has been categorically stated (Editorial, 1946) that there is no relation between the disease and sexual intercourse; but the view held by Kristjansen (1930) is interesting. He says . . . 'I think that this condition ought to be more discussed owing to its absolute venereal character . . .'. He describes how his case was infected by a girl of 16 who had a yellow vaginal discharge for two years, and who had also caused an uncomplicated non-bacterial purulent urethritis lasting for three months in another man at about the same time. This girl was examined at the local clinic for a period and was found not to have had gonorrhœa. It has therefore to be admitted that Reiter's may be acquired in venery, just as scabies may be, but like scabies it is not a strict venereal disease. But its similarity to a specific venereal disease like gonorrhœa renders it imperative that the condition be remembered whenever a case of clinical gonorrhœa with metastasis fails to show the gonococci.

Conclusion.—The original syndrome described by Reiter has been somewhat enlarged to include keratoderma and few other minor features. Gonococci have never been demonstrated in the exudates and the complement-fixation test has always been negative. Death from the condition has not been reported, and though the condition is long drawn, it is nevertheless self-limited. Treatment is symptomatic and good results have been noted with the use of sulfa drugs, penicillin, and hyperthermia. Though often associated with venery directly or indirectly, it is not a strict VD.

Summary

1. The literature on the subject is reviewed.
2. Four case reports are included.
3. The ætiology is discussed and it is considered that a bacterial sensitization from a variety of infections may cause the condition.
4. The importance of a correct diagnosis is emphasized, as is the essential non-venereal nature of the condition.

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TROPICAL EOSINOPHILIA AND SYPHILIS

(A CASE REPORT AND COMMENTARY)

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THE clinical syndrome of tropical eosinophilia, to which the following report presents a contribution, has confronted the medical profession with a number of puzzling difficulties, not the least of which is the impossibility to give a satisfactory definition of the disease.

It has not been practicable so far to classify the syndrome according to aetiological, anatomical or functional principles. All that can be done, for the time being, is to group the various signs and symptoms together and to amalgamate them to a not too clearly circumscribed clinical picture.

The leading sign of the disease is, of course, the striking eosinophilia. It is about the only feature of the syndrome which is absolutely constant, thus constituting the essential factor of the clinical picture. All other signs and symptoms, the asthma, the anatomical changes in the chest, the fever, the high B.S.R., the splenomegaly, the positive serum reactions and even the response to arsenical treatment, are factors which are more or less inconstant, and of which the one or other may be entirely absent in an individual case.

Under such circumstances the definition of the disease remains vague, and the borderline, separating it from other conditions of eosinophilia, necessarily dim, and this state of affairs is not likely to change as long as we have no explicit knowledge as to the causation of the syndrome.

In an attempt to approach the problem with special regard to its aetiology the case reported below was handled in a somewhat unorthodox manner.

Case report

H., a well-nourished Punjabi Hindu of about 50 years of age, was admitted to hospital on 5th October, 1946, with severe dyspnoea and cough, from which he suffered for the past 24 hours.

He was no stranger to this hospital when he was admitted. Already in March of this year he had been treated on account of a similar condition, and was kept under observation for about 5 weeks. At that time he had a moderate leucocytosis, the differential WBC was within normal limits, the eosinophils constituting 2 per cent of the total count.

He was re-admitted to hospital in July 1946 with rather vague complaints of epigastric tenderness for which no definite cause could be elicited in spite of a thorough investigation, which included a barium meal. Unfortunately, no WR or Kahn test was performed on this or the previous occasion.

During the second stay in hospital he had a few catarrhal signs in his chest, but no attack of asthma.

Regarding his previous history he stated that he had been suffering from cough and difficulty in breathing since December 1945; however, he was not very definite about this date and said at times that the trouble had started much earlier.

He had received treatment for malaria in summer 1945. He denied knowledge of any other previous disease. He did not give a history suggestive of previous syphilis: no penile sore or scar was visible. No history of antisyphilitic treatment was elicited.

On examination on 5th October, 1946, he was afebrile, had a pulse of 90 to 100, and was breathless and very distressed. Numerous sibilant rhonchi were scattered all over his chest, there was some flatulence and the abdomen was distended. The tongue was coated, and the pharynx injected. The liver was not enlarged. The spleen, which had been distinctly palpable during his stay in hospital from March to April, could not be felt. He was very restless and excited, and vomited several times.

His condition improved, however, after $\frac{1}{2}$ grain of ephedrine. On 8th October, 1946, a WBC count was done which showed 26,000 cells, the differential count was 36 per cent polynuclears, 32 per cent eosinophils, 18 per cent lymphocytes, 11 per cent mononuclears, 3 per cent smear cells.

The faeces were examined almost daily for ova: the result was always negative although concentration methods were used.

The skiagram of the chest showed a hazy appearance of both lung fields. The lung markings were definitely increased on both sides, and numerous minor peribronchial infiltrations were visible over both middle zones and bases. The apices were comparatively clear.

On 25th October, 1946, the following laboratory examinations were reported: total WBC

20,000, differential count 23 per cent polynuclears, 59 per cent eosinophils, 14.5 lymphocytes, 2.5 mononuclears, 1 per cent basophils.

The sedimentation rate was 3 mm. after the first hour, 9 mm. after the 2nd hour.

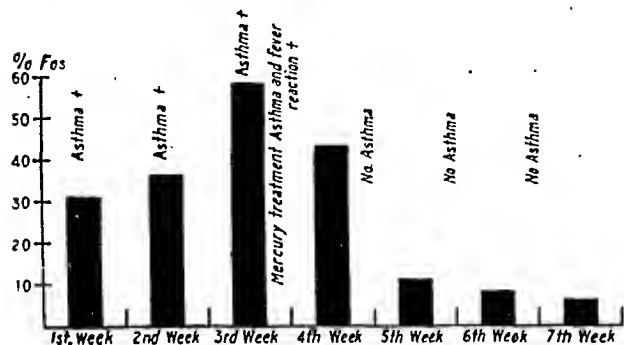


Diagram showing the response of a case of tropical eosinophilia with positive Wassermann and Kahn tests to mercury treatment.

(The eosinophil counts of the 2nd and 7th week are not mentioned in the text.)

Blood WR and Kahn—both strongly positive. WR and Kahn in CSF—both negative.

Cell count in the CSF showed 26 WBC per c.mm., predominantly lymphocytes (average of 5 counts, ranging from 20 to 30 WBC).

On the same day, the 25th October, 1946, a specific treatment was commenced, namely inunctions with 33½ per cent mercurial ointment.

On the 27th October, 1946, after 3 inunctions, the patient felt utterly miserable, with severe dyspnoea, a rapid pulse, and a temperature of 101°F.—so far, during the whole course of the disease, he had been afebrile, this being the first and only elevation of temperature while he was under observation.

However, on the following day he felt better, and the temperature was normal again.

On 31st October, 1946, 6 days after the beginning of mercury treatment, he had no asthma, only slight cough and scanty sputum. The latter contained mainly diplococci, pus cells and very little alveolar tissue.

A WBC count on the same day showed 22,600 cells, of which were 40 per cent P., 38 per cent E., 18 per cent L., 2 per cent M., 2 per cent B.

During the following days his condition showed further improvement, and the sputum became more and more scanty. He had very little cough, no asthma and slept well. His appetite became much better.

On 6th November, 1946, his WBC were 14,000 and the differential count 62 per cent P., 10 per cent E., 23 per cent L., 3 per cent M., 2 per cent B.

On the same day, the inunctions were discontinued for the time being owing to a mild stomatitis. Up to then he had been given 12 inunctions of one drachm mercury ointment each.

On 12th November, 1946, i.e. 18 days after commencement and 6 days after discontinuation

of treatment, the total WBC was 11,000, and the differential count 60 per cent P., 6 per cent E., 32 per cent L., 1 per cent M., 1 per cent B.

The blood sedimentation rate was 8 mm. after the first, 23 mm. after the 2nd hour.

His general condition was excellent. He had no cough, no sputum and felt perfectly well.

The inunctions were resumed on the 19th November, 1946, only, when his total white count was normal and the eosinophils numbered 5 per cent, and were continued for 14 days more.

Afterwards he was given 2½ mega-units penicillin. At the end of the treatment another x-ray of the chest was taken which showed a minor degree of bronchitis only.

He was discharged as clinically cured on the 20th December, 1946, with instructions to report in due time for further serological examinations.

Discussion

This case shows so many features, typical for the syndrome of tropical eosinophilia, that the diagnosis appears to be certain beyond doubt.

There are 2 questions, which are likely to arise in this connection, namely:—

(i) Did this patient suffer from syphilis?

Supposing the positive Wassermann and Kahn tests were just unspecific reactions—as most workers seem to presume at present—no changes in the CSF should be expected.

Our patient, however, had a cell count in the CSF of 26, mainly lymphocytes. This, together with the positive serum reactions, is strongly suggestive of syphilis.

The transient fever and deterioration of the patient's condition after the 3rd mercury inunction fit well into this picture. Menon (1946) observed such initial exacerbations with subsequent rapid improvement after arsenical treatment of tropical eosinophilia. In his opinion such a reaction settles practically the diagnosis.

The writer suggests that the temporary increase of the intensity of the process should be interpreted as a Jarisch-Herxheimer reaction, so typical for the response of a number of syphilitic conditions to specific treatment.

(ii) Another question is likely to be asked in this connection: 'Was the tropical eosinophilia in this case connected with the syphilitic infection?'

Weingarten (1943) in his original paper was inclined to think that the syphilis, which he observed in one of his patients, was just an accidental concomitant of the syndrome. He believed that by chance he had discovered that arsenicals—quite apart from their antisyphilitic action—were also a specific remedy for tropical eosinophilia.

As far as one can see, his view has been generally accepted by all later workers and, more important, by all practitioners, who treat the disease with doses of arsenicals quite inadequate for the management of syphilis.

Now, it is extremely improbable that anti-syphilitics, other than arsenicals, should likewise influence tropical eosinophilia, if the latter were entirely unconnected with syphilis.

Out of such considerations this patient was given no arsenicals at all, but was treated by inunctions with mercurial ointment. Penicillin or bismuth were not chosen on account of their much greater therapeutic amplitude. The former was given only after clinical recovery in order to vouchsafe a complete cure.

Following this line of treatment the asthmatic condition subsided within one week, and the eosinophilia was reduced almost to normal within 2 weeks from the beginning of the inunctions. No better results can be expected from treatment with arsenicals.

The conclusion to be drawn from this therapeutic experiment can only be that the disease has apparently something to do with syphilis.

Eosinophilia and asthma point strongly in the direction of an allergic condition. The syndrome in the writer's opinion should therefore be interpreted as an anaphylactic spirochaetosis.

Of course, it cannot be denied that other anaphylactic conditions may evoke the same clinical picture, a possibility which is the more likely as a number of cases fail to respond to arsenicals.

However the writer is unable to accept without reservation the view that the frequent positive Wassermann and Kahn tests in tropical eosinophilia are, as a rule, unspecific. The possibility of syphilis in connection with the syndrome should in no instance be dismissed without careful investigation, of which the testing of the CSF is an essential factor.

Summary

A case of tropical eosinophilia with positive Wassermann and Kahn reactions in the serum and a high cell count in the CSF has been described which responded well to anti-syphilitic treatment other than arsenical.

The view has been expressed that the syndrome known as tropical eosinophilia constitutes—in many instances—a condition connected with syphilis, probably an anaphylactic spirochaetosis.

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[In such cases WR may be positive and Kahn negative. Further, the reaction weakens or disappears with very little anti-syphilitic treatment. This and other recent observations on the disease are not in favour of the author's thesis.—EDITOR, I.M.G.]

PENICILLIN TREATMENT OF EARLY SYPHILIS

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SINCE Mahoney and his associates first demonstrated the effect of penicillin on *Treponema pallidum* in experimental syphilis in rabbits and reported the results of a pilot study of the effects of penicillin in four cases of primary syphilis in males, reports of a preliminary nature have been published on this subject by a number of writers. I shall discuss in this report observations on 662 cases of early syphilis that were treated with penicillin in Ceylon Army Command from March 1945 to April 1946.

Material.—It was realized that the material at my disposal was too small for any statistical analysis and that the period of post-treatment observation was not of sufficient length as, owing to the release/repatriation of the majority of the cases it was impossible to carry out a complete follow-up of each case. However I considered that it would be useful to tabulate the observations that were recorded in this one year period.

Table I shows the details of these 662 cases. One hundred and sixty-one showed *Treponema pallidum*; 22 out of these 161 were seronegative. The remaining 501 cases did not show *Treponema pallidum* and were diagnosed on clinical and serological evidence.

Treatment.—Forty thousand Oxford Units of penicillin in 2 c.c. of sterile distilled water were injected intramuscularly every three hours for 7½ days. Serological tests were done before commencing treatment, after it was completed and then at intervals varying from 7 to 90 days.

Table II shows the details of 405 cases treated with penicillin. Some had 0.3 to 1.2 grammes of neoarsenobillon and 0.2 to 6 grammes of bismuth. Others had 4 to 8 grammes of neoarsenobillon and 2 to 4 grammes of bismuth. All cases that were observed for less than 15 days are not included in this table.

Reaction.—Data are available from 292 cases. Two hundred and eighty-two were Indians.

1. Rise of temperature.

	Number of cases	
99°F. to 102°F.	42	14.4%
103°F. to 105°F.	8	2.7%
105°F. and over	6	0.3%

The temperature rose during the first day of treatment and fell down by the end of 24 hours except in one case in which it lasted for three days.

2. Other reactions attributed to penicillin.

(a) Appearance of a rash, not previously present in 2 cases. Rash subsided in two days in one case, and in three days in the other.

(b) Flare up of rash previously present in 1 case.

TABLE I

Nationality		TREATED WITH PENICILLIN ALONE					TREATED WITH PENICILLIN AFTER ADEQUATE OR INADEQUATE TREATMENT WITH ARSENIC AND/OR BISMUTH				
		Seronegative primary	Seropositive primary	Secondary	Total number in different stages	<i>Treponema pallidum</i> present	Seronegative primary	Seropositive primary	Secondary	Total number in different stages	<i>Treponema pallidum</i> present
Indians ..	293	8	92	48	148	74	Nil	101	44	145	4
Ceylonese ..	231	10	151	47	208	59	Nil	16	7	23	2
British ..	138	4	34	11	49	21	Nil	65	24	89	1
Total number of cases.	662	22	277	106	405	154	Nil	182	75	257	7

TABLE II

Period of observation (days)	Number of cases	TREATED WITH PENICILLIN			TREATED WITH PENICILLIN AFTER ADEQUATE OR INADEQUATE ARSENIO-BISMUTH THERAPY		
		Sero-negative primary	Sero-positive primary	Secondary	Sero-negative primary	Sero-positive primary	Secondary
15-30 ..	42	4	15	10	Nil	7	6
31-75 ..	121	3	56	23	Nil	26	13
76-150 ..	124	7	44	16	Nil	39	18
151-270 ..	84	7	35	10	Nil	21	11
271 and above ..	34	1	14	8	Nil	6	5
Total number of cases	405	22	164	67	Nil	99	53

(c) Cramps in abdominal muscles in 2 cases. These subsided in 48 hours.

(d) Pain in the joints in 7 cases. It commenced after 2 injections in 4 cases and subsided after 1, 3, 6 and 7 days respectively.

(e) Headache in 4 cases.

(f) Pain in the chest in 2 cases.

(g) Pain in the teeth in 1 case.

(h) Pain in the sore in 1 case.

Pilsbury (1945), Moore *et al.* (1944), Mahoney *et al.* (1943), and Leifer (1945) recorded Herxheimer reactions in 25, 59, 86 and 91 per cent respectively. Only 17.4 per cent of the present series and 29 per cent of the seropositive primary cases showed a rise of temperature. I would not attribute the low percentage of Herxheimer reactions in these cases to any racial difference. The explanation of this probably lies in the paucity of the nursing staff in Field Units. Moreover, most of the Indian patients came from Labour Units; they were intellectually poor, and would not bring to the notice of the nursing staff or the medical officers any reaction unless it was very severe.

Time taken by the lesions to heal.—Chancres in 240 cases healed on the average in 8 to 10 days. Table III shows average number of days

taken in healing according to the stage of the disease when treatment was commenced. Chancres took the maximum time to heal in seronegative primary cases and the minimum time in secondary cases.

TABLE III

Stage of the disease	Number of cases	Average number of days taken for the ulcers to heal
Seronegative primary ..	21	14.2
Seropositive primary ..	179	10.2
Secondary ..	40	8.9

Healing of lesions in the secondary stage :—

1. *Rash.*—Average number of days for the rash to disappear in 47 cases, 11 days.
2. *Secondary syphilides of soles of feet* (one case).—21 days.
3. *Hyperkeratosis of soles of feet* (one case).—30 days.
4. *Mucous patches, tongue* (one case).—14 days.
5. *Ulcer tongue* (one case).—9 days.

TABLE IV

Changes in the titre of Kahn tests within 1 to 3 days of completion of penicillin treatment

Stage of disease	Total number of cases	TITRE OF KAHN UNITS BEFORE PENICILLIN TREATMENT, 4 OR ABOVE					TITRE OF KAHN UNITS BEFORE PENICILLIN TREATMENT, 1, 2 OR 3			TITRE OF KAHN UNITS BEFORE PENICILLIN TREATMENT, NIL		
		After penicillin					After penicillin			After penicillin		
		Nil Kahn units	3, 2 or 1 Kahn units	Decrease in Kahn units but above 4	No change in titre	Titre of Kahn units increased	Nil Kahn units	No change in titre of Kahn units	Increase in titre of Kahn units	Nil Kahn units	Increase to 2 or 3 Kahn units	Increase to 4 or more Kahn units
Seronegative primary	19	..	..	..	..	..	..	..	..	16 (84.2%)	2 (10.5%)	1 (5.2%)
Seropositive primary	103	8 (10.0%)	12 (15.0%)	18 (22.5%)	22 (27.5%)	20 (25.0%)	1 (14.3%)	2 (28.1%)	4 (37.1%)	10 (62.5%)	5 (31.2%)	1 (6.3%)
Seropositive primary, treated with penicillin after arseno-bismuth therapy.	77	17 (32.2%)	16 (30.2%)	11 (20.7%)	4 (7.5%)	5 (9.4%)	Nil	Nil	Nil	23 (95.8%)	1 (4.2%)	Nil
Secondary	28	4 (16.6%)	..	9 (37.5%)	7 (29.1%)	4 (16.8%)	..	1 (50.0%)	1 (50.0%)	1 (50.0%)	1 (50.0%)	..
Secondary, treated with penicillin after they were on arseno-bismuth therapy.	30	4 (21.0%)	3 (15.8%)	3 (15.8%)	8 (43.1%)	1 (5.2%)	..	7 (100.0%)	..	3 (75.0%)	..	1 (25.0%)
	257	33 (18.7%)	31 (17.3%)	41 (23.2%)	41 (23.2%)	30 (17.6%)	1 (6.2%)	10 (62.5%)	5 (31.3%)	53 (81.4%)	9 (13.8%)	3 (4.8%)

TABLE
Changes in Wassermann reaction* within 1 to 3

	Total number of cases	BEFORE PENICILLIN WR ++				BEFORE PENICILLIN	
		After penicillin				After	
		Negative	±	+ or + ±	++	Negative	±
Seronegative primary ..	16	..	..	..	..	..	..
Seropositive primary ..	131	7 (8.3%)	2 (2.3%)	15 (17.8%)	60 (71.6%)	..	1 (12.5%)
Seropositive primary, treated with penicillin after arseno-bismuth therapy.	63	4 (16.6%)	..	4 (16.6%)	16 (66.8%)	3 (42.8%)	..
Secondary	40	1 (3.0%)	1 (3.0%)	4 (12.1%)	27 (81.9%)	..	..
Secondary, treated with penicillin after arseno-bismuth therapy.	20	1 (9.1%)	2 (18.2%)	..	8 (72.7%)	..	..
	270	13 (8.5%)	5 (3.2%)	23 (15.1%)	111 (73.2%)	3 (18.7%)	1 (6.2%)

* WR was done by Wyler's modification.

6. *Leukoplakia upper lip* (one case).—4 days.

7. *Condyloma and penile warts* (one case with cauterization).—45 days. Two further cases without cautery.—13 and 20 days respectively.

8. *Joint affections*.—3 cases in 26, 10 and 9 days respectively.

9. *Osteoperiostitis* (tibia improved in one case).—12 days.

Serologic response within 1 to 3 days of the completion of penicillin treatment.—Tables IV and V show the changes in the titre of Kahn test and Wassermann reaction when put up within 1 to 3 days of the completion of treatment. Forty-seven and 37 cases showed the provocative effect on Kahn test and Wassermann reaction respectively. This tendency to provocation was most marked in seropositive primary cases that had had no arsenic and/or bismuth before penicillin treatment. Three of 19 seronegative primary cases showed positive Kahn test and two showed positive Wassermann reaction after treatment. Sixty-five cases that had positive Wassermann reaction and negative Kahn test showed positive Kahn test in 12 cases after treatment. The titre of Kahn units showed more tendency to reduction by the end of penicillin treatment than the changes in the Wassermann reaction. 54.5 per cent of the cases who had positive Kahn test before treatment showed definite reduction in the Kahn titre but

the Wassermann reaction of the same cases showed similar changes in 30 per cent only. The technique used for Wassermann reaction has very limited scope for the determination of the titre of the reagin but it is definitely obvious from the fact that 33 (18.7 per cent) out of 176 cases who showed 4 or more Kahn units before treatment became negative after treatment and only 13 (8.5 per cent) cases out of 152 who had Wassermann reaction ++ became negative.

Sixteen cases had a titre of 1, 2 or 3 Kahn units before treatment. Ten showed provocative effect and only one became negative after treatment.

TABLE VI
Complete seroreversal Wassermann reactions

Stage of disease	Number of cases	Average interval in days	Complete reversal in number of days
Seropositive primary	43	16.0	29.5
Seropositive primary, treated with arsenic and/or bismuth before penicillin.	29	16.0	30.3
Secondary	13	32.0	81.0
Secondary, treated with arsenic and/or bismuth before penicillin.	14	38.0	54.0

V
days of completion of penicillin treatment

WR + ±		BEFORE PENICILLIN WR +				BEFORE PENICILLIN WR ±			BEFORE PENICILLIN WR NEGATIVE	
penicillin		After penicillin				After penicillin			After penicillin	
+ or + ±	++	Negative	±	+	++	Negative	±	+ or ++	Negative	±, + or ++
..	..	..	..	..	..	..	..	..	14 (87.5%)	2 (12.5%)
..	7 (87.5%)	4 (22.2%)	3 (16.6%)	Nil	11 (61.6%)	1 (16.6%)	1 (16.6%)	4 (66.8%)	9 (60.0%)	6 (40.0%)
4 (57.2%)	Nil	4 (40.0%)	2 (20.0%)	3 (30.0%)	1 (10.0%)	4 (100.0%)	..	..	16 (83.8%)	2 (11.2%)
1 (100.0%)	..	3 (75.0%)	..	..	1 (25.0%)	1 (50.0%)	1 (50.0%)	..	..	..
..	..	2 (66.6%)	..	..	1 (33.4%)	..	1 (50.0%)	1 (50.0%)	4 (100.0%)	..
5 (31.2%)	7 (43.7%)	13 (37.3%)	5 (14.2%)	3 (8.5%)	14 (40.0%)	6 (42.8%)	3 (21.4%)	5 (35.8%)	43 (81.1%)	10 (18.9%)

++ = 3 doses and 5 doses of complement fixed.

+ ± = 3 doses fixed, 5 doses partially fixed.

+ = 3 doses fixed, 5 doses not fixed.

± = Partial fixation of 3 doses, 5 doses not fixed.

TABLE VII

Complete seroreversal Kahn tests

Stage of disease	Number of cases	Average interval in days	Complete reversal in number of days
Seropositive primary	31	19.0	47.8
Seropositive primary, treated with arsenic and/or bismuth before penicillin treatment.	28	16.0	23.5
Secondary syphilis ..	14	42.0	92.0
Secondary syphilis, treated with arsenic and/or bismuth before penicillin.	14	40.0	76.0

Tables VI and VII show the average number of days taken for complete seroreversal in different stages of the disease in 99 cases. All cases whose blood was examined at longer intervals are not included in these tables.

Complete seroreversal was quicker in both the seropositive primary and the secondary stage when penicillin was administered after a few or

more injections of arsenic and/or bismuth. The tendency to become negative was more marked in Kahn tests when these were done at the end of penicillin treatment as shown in table IV, but final seroreversal to negative was much quicker in Wassermann reaction than in Kahn tests especially in seropositive primary syphilis.

Mahoney *et al.* recorded 70 days as average number of days for seroreversal. Leifer recorded that the majority of his cases showed seroreversal in 120 days. The writer observed this taking place in 48 and 92 days in seropositive primary and secondary syphilis respectively. Two hundred and two days was the highest number of days for seroreversal in seropositive primary and secondary syphilis. Nine out of 55 cases that were included in tables VI and VII showed reversal in less than 20 days. Sometimes the Wassermann reaction became ± and the Kahn test remained negative. The writer does not consider these to be relapses as after this fluctuation from negative to doubtful and back to negative, they showed a stationary negative when tests were repeated.

Late effect of treatment.—Seronegative primary syphilis.

Table VIII shows the results of the last test in 22 cases of seronegative primary syphilis. Twenty were negative, one showed a weakly positive Wassermann reaction. (Wassermann

reaction \pm^*) on the 29th day and the other 2 Kahn units on the 37th day. There were four cases in this group who showed provocative effect on Wassermann reaction and Kahn test after penicillin treatment. Two became negative within one month and the other two, who had weak positive Wassermann reaction and Kahn tests on the last test, were likely to become

arseno-bismuth therapy. Twenty-one per cent of these 99 and 28 per cent of those treated with penicillin only were seropositive on their last test.

Table X shows the serologic response of 120 cases of secondary syphilis, 44.2 per cent were seronegative on their last test. The proportion of negative to positive was largest in the group

TABLE VIII

Serologic response and relapses in seronegative primary syphilis

Period of observation (days)	Number of cases	WR ++ and Kahn units 4 or more	WR + or \pm and Kahn units 4 or more	WR negative and Kahn units 4 or more	WR ++ or + and Kahn units 3, 2, 1 or nil	Total number of cases with positive WR and Kahn tests	WR \pm and Kahn units 3, 2 or 1	WR \pm and Kahn units nil	WR negative and Kahn units 3, 2 or 1	Total number of cases with weak positive or doubtful result	WR and Kahn negative	Serologic relapses
0-30 ..	4	..	..	..	..	..	..	1	..	1	3	Nil
31-74 ..	3	..	..	..	..	..	..	..	1	1	2	Nil
75-149 ..	7	..	..	..	..	..	..	..	..	..	7	Nil
150-270 ..	7	..	..	..	..	..	..	..	..	..	4	Nil
270-398 ..	1	..	..	..	..	..	..	..	..	..	1	..
TOTAL ..	22	..	..	..	..	..	..	1 (4.5%)	1 (4.5%)	2 (9.1%)	20 (90.9%)	Nil

negative if they had been observed longer. There were no relapses in this group.

Table IX shows serologic response of 264 cases of seropositive primary syphilis. 58.5 per cent were seronegative at their last test. The proportion of negatives to positives was largest in the group that was observed for 75 to 150 days. 25.3 per cent were seropositive and 12.8 per cent showed weak positive or doubtful results. There were nine relapses which I will discuss later.

I shall not go into the details of the seropositive cases that were observed for less than 75 days. Thirty-nine cases were observed for more than 75 days. Eighteen cases showed weak positive Wassermann reaction and/or Kahn units 3, 2 or 1 on their last test, two of these 18 were fluctuating from negative to doubtful and back to negative; 22 out of these 39 had Wassermann reaction and Kahn tests positive on their last test; 18 had already shown reduction in the titre of Kahn or Wassermann. Four, who showed no changes, were observed for 80, 159, 184 and 320 days.

Table IX includes (i) 19 cases who were observed for 9 to 14 months. There were 4 seropositive cases in this group. Three had already shown reduction in the titre and one showed no change. There was one relapse in this group. (ii) 99 cases of seropositive primary syphilis who were treated with penicillin after they had

that was observed up to 270 days. 18.3 per cent showed weak positive or doubtful results. There were 5 relapses which will be discussed later.

Cases that were observed for less than 75 days will not be discussed. Twenty-five cases were observed for more than 75 days. Ten out of 12 cases had Wassermann reaction and/or Kahn test positives, and of these 11 had already shown reduction in the titre of Kahn units and/or a similar change in the Wassermann. Two cases that showed no change in Wassermann and/or Kahn were observed for 76 and 96 days respectively. The remaining 13 of the 25 cases showed weak positive or doubtful results on their last test. All these had shown reduction in the titre of both Wassermann reaction and Kahn tests and were likely to become negative if they had been observed over a longer period.

Table XI shows 14 (3.4 per cent) serologic relapses in 405 cases. There were 3 relapses amongst 138 British cases and 11 amongst 524 Indians and Ceylonese. If all cases that were observed for less than 113 days are excluded (the minimum period during which a serologic relapse was observed), the incidence of relapse was 8.3 per cent. There were no relapses in seronegative primary; seropositive primary showed 9 (3.4 per cent) in 264 cases, and secondary syphilis showed 5 (4.1 per cent) in 120 cases. Incidence of relapses in seropositive primary syphilis would have been less than 3.4 per cent but for the fact that 4 out

*The correct designation of such a reaction is 'doubtful'.—EDITOR, I.M.G.

TABLE IX
Serologic response of seropositive primary syphilis

Period of observation (days)	Number of cases	WR ++ and Kahn units 4 or more	WR + ± and Kahn units 4 or more	WR negative and Kahn units 4 or more	WR ++ or + Kahn units		Total number of cases with positive WR and Kahn tests	WR ± and Kahn units 3, 2 or 1	WR + and Kahn units nil	WR negative and Kahn units 3, 2 or 1	Total number of cases with weak positive or doubtful results	WR and Kahn negative	†Serologic relapses	Serologic relapses associated with clinical relapses
					3, 2 or 1	Nil								
0-30	22	8	1	2	2	2	15 (68.1%)	2	..	..	2 (9.2%)	5 (22.7%)	1 (1.2%)	Nil
31-75	82	13	9	7	1	1	30 (36.5%)	1	..	11	14 (17.1%)	38 (46.4%)	6 (10.5%)	*3 (5.25%)
76-150	83	5	3	1	1	1	11 (13.3%)	2	3	5	10 (12.1%)	61 (13.4%)	2	..
151-270	57	4	2	..	1	1	7 (12.2%)	2	3	2	7 (12.2%)	37 (65.0%)	2	..
271 and above	20	3	..	..	1	1	4 (20.0%)	1	..	..	1 (5.0%)	13 (65.0%)	1	..
Total number of cases.	264	33	15	10	3	6	67 (25.3%)	8	8	18	34 (12.8%)	154 (58.5%)	9 (3.4%)	4 (1.5%)

Note.—(1)

(2)

(3)

* This includes 2 cases who had chancre redux. Please refer to table XI and the discussion below that for details of these cases.
† Serologic relapses includes all relapses which were associated with clinical relapses. This applies to table X also.
(3) It is regretted that the total number of cases shown in the table are 264 whilst in table II the total number of seropositive primary cases is shown as 263. As the original records are not at the disposal of the writer it is not possible to correct the figures.

TABLE X

Blood serologic relapse in secondary syphilis after penicillin treatment

Period of observation (days)	Number of cases	WR ++ and Kahn units 4 or more	WR + ± and Kahn units 4 or more	WR negative and Kahn units 4 or more	WR ++ or + Kahn units		Total number of cases with positive WR and Kahn tests	WR ± and Kahn units 3, 2 or 1	WR + and Kahn units nil	WR negative and Kahn units 3, 2 or 1	Total number of cases with weak positive or doubtful results	WR and Kahn negative	Serologic relapses	Serologic relapses associated with clinical relapses
					3, 2 or 1	Nil								
0-30	16	8	..	..	1	3	12 (75.0%)	..	1	1	2 (12.5%)	2 (12.5%)	..	..
31-75	35	9	1	3	3	..	16 (45.8%)	..	3	4	7 (20.0%)	12 (34.2%)	..	..
76-150	30	4	2	2	..	1	9 (30.0%)	..	..	5	5 (16.6%)	16 (53.4%)	..	..
151-270	26	1	..	..	..	1	2 (7.7%)	1	1	2	4 (15.4%)	16 (61.5%)	4 (15.4%)	2 (7.7%)
271 and above	13	..	..	..	..	1	1 (7.7%)	1	..	3	4 (30.8%)	7 (53.8%)	1 (7.7%)	..
Total number of cases.	120	22	3	5	4	6	40 (33.3%)	2	5	15	22 (18.3%)	53 (44.2%)	5 (4.2%)	2 (1.6%)

TABLE XI
Relapses—Individual cases

Serial number	Case number	Stage of disease	Number of days after treatment relapsed	Serological	Clinical	CEREBROSPINAL FLUID							Signs and symptoms of neurosyphilis	
						Wassermann reaction						Cells per c.mm.		Protein mg. %
						1 in 5 dilution of CSF	1 in 2.5 dilution of CSF	1 vol. of undiluted CSF	2 vol. of undiluted CSF					
1	8093	Seropositive primary.	113*	Yes	No	N	6/8 (±)	0/8 (+)	0/4 (+±)	2	30	Nil		
2	5799	Seropositive primary.	122	Fluctuating between negative and doubtful for 71 days after the clinical relapse.	Mucous patches and chancre redux.	CSF	not examined		..	..	..	Nil
3	8072	Seropositive primary.	151	Yes	No clinical relapse up to 151st day. Not observed after that.	CSF	not examined		..	..	..	Nil
4	15 Br.	Secondary	155	Yes	No information available.	CSF	not examined		..	..	..	Nil
5	11637	Seropositive primary.	165	Yes	Chancre redux	CSF	not examined		..	..	..	Nil
6	5549	Secondary	176	Yes	Mucocutaneous	CSF negative (No information about the dilutions)			..	2	25	Nil		
7	945	Seropositive primary.	177	Yes	No information available.	N	N	N	N	1	45	Nil		
8	4026	Secondary	191	Yes	No relapse up till 191st day. Not observed after that.	CSF	not examined		..	..	..	Nil
9	12456	Secondary	207	Yes	(1) Cutaneous. (2) Ulcer on the prepuce. No T.P. detected.	N	N	N	N	2	30	Nil		
10	5073	Seropositive primary.	210	Yes	Chancre redux	N	N	6/8 (±)	0/8 (+)	3	30	Nil		
11	1344	Seropositive primary.	243	Yes	No clinical relapse up till 243rd day. Not observed after that.	N	N	N	N	No record of cells and protein.		Nil		
12	11675	Seropositive primary.	276	Yes	No information available.	CSF	not examined		..	..	..	Nil
13	1931	Secondary	416	Yes	No information available.	CSF	not examined		..	..	..	Nil
14	12850	Seropositive primary.	Cannot be stated definitely as he was not examined between 176 to 466 days. Blood was positive on the 467th day.	Yes	Cutaneous	N	N	N	N	2	30	Nil		

*Refer to table V for interpretation of results of cerebrospinal fluids.

of 9 cases that relapsed were diagnosed as syphilis in the 6th, 7th or 8th months of 1944. They were put on arseno-bismuth therapy but it was stopped as two of them developed toxic jaundice, one had dermatitis, and the fourth one did not turn up for treatment. They were put on penicillin, 7, 4, 7 and 11 months respectively after arseno-bismuth therapy was stopped.

Clinical and concomitant serologic relapses were observed in 4 out of these 14 cases. Two out of the remaining 10 serologic relapses showed a chancre redux and one had an ulcer on the prepuce; in none of these cases was *Treponema pallidum* demonstrated. Inguinal glands were enlarged however, and there was no history of fresh exposure. Four of the remaining 7 cases were not observed after the serologic relapse was detected as they were either released or transferred from Ceylon Command; venereal cards of the other three cases showed no record of clinical relapse though they had reported for serologic tests on one or more occasions after the serologic relapse was detected. If the possibility of reinfection in the above-mentioned 2 cases with chancre redux was not considered the clinical and concomitant serologic relapse rate was 6 (1.4 per cent) in 404 cases, and excluding all cases that were observed less than 113 days it came to 6 (3.5 per cent) in 168 cases. The relapse rate for seropositive primary and secondary syphilis on the same basis was 4 (3.3 per cent) in 119 and 2 (5.0 per cent) in 41 cases respectively.

The cerebrospinal fluid was tested in 7 cases. The Wassermann test was negative in 6 cases and 1 (no. 8093 in table XI) showed partial

	Number	Per cent
WR of blood and the CSF negative .. Number of cells per c.mm. varied from 0-5 in all cases except two who showed 7 and 8 cells respectively. Protein content varied from 20-40 mg. except in one case who had 60 mg.	39	75.0
WR of blood positive and the CSF negative Five out of these 8 cases were serologic relapses and three out of these five were clinical relapses as well.	8	15.4
WR of blood negative and the CSF positive ..	5	9.6
WR of blood and the CSF positive ..	6	11.5
Result of WR of blood not known and the CSF positive ..	2	3.8

Twelve out of 52 cerebrospinal fluids were from the British personnel and only 2 had a positive Wassermann amongst this group.

There was partial or complete fixation of 3 doses of complement with 1 in 5* dilution of the cerebrospinal fluid in 4 cases, with 1 in 2.5 dilution in 4 cases and with 1 volume of undiluted fluid in 5 cases.

Ten out of 13 cases with positive Wassermann of the spinal fluids were seropositive primary syphilis and the remaining three were cases of secondary syphilis. Relatively higher incidence of the positive spinal fluids in seropositive primary syphilis could be explained by the fact that 5 out of these 10 were not fresh cases. Four of them had irregular treatment with arseno-bismuth therapy which was stopped for 4,

TABLE XII

Wassermann reaction of cerebrospinal fluid after 6 months or later

Stage of disease	Total number of cases	WR of the serum and CSF negative	WR of the serum positive and CSF negative	WR of the serum and CSF positive	WR of the serum negative and CSF positive	WR of the serum not recorded and CSF positive
Seronegative primary ..	4	4	Nil	Nil	Nil	Nil
Seropositive primary ..	34	19	5	3	5	2
Secondary ..	14	8	3	3	Nil	Nil
TOTAL ..	52	31	8	6	5	2

fixation of three doses of the complement in 1 in 2.5 dilution. None showed increase in the cells. Protein was 25 to 30 mg. per 100 c.c. except in one case who had a negative Wassermann and 45 mg. of protein.

Table XII shows results of the Wassermann reaction of 52 cases whose cerebrospinal fluid was tested six months or later after penicillin treatment.

3, 11 and 18 months respectively before they were put on penicillin. The fifth one gave no history of primary lesion and was admitted with positive Wassermann and Kahn tests. Incidence of a symptomatic neuro-syphilis, 13 (25 per cent) in

* A 1 in 5 dilution of CSF for a WR is rather weak. Wyler recommends a series of 1 in 5, 1 in 2, undiluted CSF, and 2 volumes of undiluted CSF. Greval employs only the last two strengths.—Editor, I.M.G.,

52 cases, was obviously higher than the figures quoted by some of the well-known authorities. This was very probably due to lack of sufficient information in the clinical records that were at our disposal.

Summary

1. *Material*.—The case cards of 662 cases of syphilis who were treated with penicillin were reviewed. A large number of cases was not considered in preparing the tables in the preceding pages as the relevant information was not available.

2. *Reaction*.—(a) Rise of temperature occurred during the first day of treatment in 17.4 per cent of the cases; it rose above 103°F. in 9 cases only and came down by the end of 24 hours in all except one case in whom it lasted for three days.

(b) Cutaneous reaction and pain in the joints and muscles were also observed in a few cases.

Reaction was never so severe that treatment had to be stopped.

3. *Healing of the lesions*.—Primary lesions healed in 8 to 10 days. Rash healed in 11 days on the average.

4. *Results of Wassermann and Kahn tests within 1 to 3 days of the completion of penicillin treatment*.—Provocative rise of titre of Kahn units occurred in 47 cases out of 256. Similar provocation was also observed in the Wassermann reaction in 37 out of 270 cases. Provocation was most marked in seropositive primary syphilis if they were not put on arsenic and/or bismuth before penicillin treatment. The titre of Kahn units showed reduction in 54.5 per cent. Similar change in Wassermann was shown by 30 per cent only.

5. *Seroreversal*.—Final seroreversal was quicker in Wassermann than in the Kahn unlike the initial effect as mentioned in para 4 above. Seroreversal was quicker in those cases of seropositive primary syphilis who were switched on to penicillin after they had 1 to 6 injections of arsenic and/or bismuth. Seroreversal took longest time in secondary syphilis.

6. *Late effects*.—Seronegative primary cases had the most favourable response. 90.9 per cent were seronegative on their last test. Seropositive primary and secondary syphilis showed 58.5 per cent and 44.2 per cent respectively as seronegative on their last test.

7. *Relapses*.—No relapses occurred in seronegative primary syphilis. Serologic relapse rate was 3.4 per cent in seropositive primary syphilis and 4.1 per cent in secondary syphilis. If the incidence is calculated by excluding all cases observed for less than 113 days (the minimum period during which a serologic relapse was observed), the serologic relapse rate came to 8.3 per cent. Serologic and concomitant clinical relapses were 3.5 per cent on the same basis.

8. *Cerebrospinal fluid*.—Fifty-two cases were tested six months or later after penicillin treatment. The fluid was positive in 13 cases.

Serum and spinal fluid were positive in 6 (11.5 per cent) cases.

9. The probable explanation for the relatively higher incidence of serologic relapses and of positive cerebrospinal fluid in seropositive primary cases was the inclusion in this group of a few cases who were not fresh cases of seropositive primary syphilis. They were put on penicillin after they had irregular treatment with arsenic and/or bismuth.

10. Incidence of relapses as mentioned above was lower than the rate recorded by some well-known authorities with arseno-bismuth therapy. This, however, should not necessarily convey that penicillin was superior to arsenic and/or bismuth. The relapse rate is sure to go up with the lapse of time and it will be long before it will be possible to assess the effect of penicillin treatment in early syphilis.

I take this opportunity to express my gratitude to the personnel of 24 Indian Field Laboratory, to the Medical Officers and Specialists in Venereology whose Clinical records were so readily made available to me, to Major M. G. Sharma, I.A.M.C., to Brigadier C. A. Slaughter, R.A.M.C., D.D.M.S., Ceylon Army Command, to Lieut.-Colonels J. Reidy, A. C. Bhatara and R. M. Hector, R.A.M.C., and to Major S. C. Banerji, the Adviser in Venereology, GHQ(I).

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PENICILLIN THERAPY IN CHAN-CROIDAL BUBO

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In the literature one hardly finds the use of penicillin in the treatment of infection with *Hæmophilus ducreyji*. Nair (1945) did not find any action of penicillin on chaneroid. Prebble (1946) observed no improvement in soft sore with penicillin therapy but he advocated local application of weak penicillin solution to promote healing in chaneroid which is supposed to act by clearing the secondary infection. The present writer (1945a) reported on the routine use of penicillin in treating chaneroid and has since been using it with very encouraging result in buboes due to *H. ducreyji* infection. He (1945b) advocated injection of penicillin in the bubo every three hours. He (1946a) strongly advocated penicillin therapy particularly in multiple infection of venereal origin. He (1946b) has treated bubo with and without phagedena with penicillin alone successfully. In complications of chaneroid, like a threatened bubo, he (1947) found better result by continuing the penicillin injections in doses of 0.02 M.U. every three hours into the bubo along with

intramuscular injections of penicillin or alone. For sulphonamide intolerant cases of chancroid penicillin has been advocated by Strakosch and his co-workers (1945) and Day (1946).

Recently the author has observed a large number of cases of bubo, some with pudendal sores, caused by Ducrey's bacillus as shown by positive Ito-Reinstierha's intradermal antigenic test and negative dark-field and W.R. test.

TABLE I
Cases treated with penicillin alone

Number	Lesions	0.05 M.U. 3-hourly I.M.	Total dose of penicillin, M.U.	Time for cure in hours
1	Bubo alone	Penicillin alone.	0.30	38
2	"	"	0.25	36
3	"	"	0.35	40
4	"	"	0.40	46
5	"	"	0.45	48
6	"	"	0.38	38
7	"	"	0.25	58
8	"	"	0.30	84
9	"	"	0.30	82
10	"	"	0.30	88
11	"	"	0.30	86
12	"	"	0.45	40
13	"	"	0.50	48
14	"	"	0.55	50
15	"	"	0.54	60
16	"	"	0.58	64
17	"	"	0.50	48
18	"	"	0.50	46
19	"	"	0.50	44
20	"	"	0.50	48
21	"	"	0.50	48
22	"	"	0.50	48

TABLE II
Cases of bubo treated with penicillin (0.05 M.U.) intramuscularly every 2 to 3 hours together with sulphadiazine (0.5 gm.) orally every 4 to 6 hours

Number	Lesion	Total penicillin, M.U.	Total dose of sulphadiazine, gm.	Time of cure in hours
1	Bubo alone	0.50	7.0	48
2	"	0.55	8.0	50
3	"	0.50	8.0	48
4	"	0.45	9.0	50
5	"	0.50	6.5	48
6	Bubo and penile sore.	0.50	7.0	50
7	"	0.60	8.0	55
8	"	0.45	8.5	48
9	"	0.50	6.5	50
10	"	0.50	7.0	48

TABLE III

Cases treated with intramuscular injections of penicillin (0.5 M.U.) every 2 to 3 hours together with penicillin (0.02 M.U.) injections in the bubo every 8 hours with and without sulphadiazine and sulphathiazole (0.25 gm. each) orally

Number	Lesion	Total penicillin I.M., M.U.	Total penicillin in bubo, M.U.	Sulphadiazine, gm.	Cure in hours
1	Bubo alone	0.55	0.5	6.0	24
2	"	0.50	0.5	8.0	30
3	"	0.60	0.2	10.0	28
4	Bubo and pudendal sore.	0.55	0.4	12.0	30
5	"	0.50	0.5	8.0	24
6	"	0.50	0.5	7.0	24

Discussion

Successful penicillin therapy in chancroidal buboes depend principally on the susceptibility of the infecting organisms (*Haemophilus ducrey*) and on an adequate concentration of penicillin in the blood. Studies of *H. ducrey* *in vitro* have shown the activity of penicillin against this infection (Mortara *et al.*, 1944). Meads and his associates (1945) have observed that the only other gram-negative bacillus which is sensitive to penicillin is *H. ducrey*.

A dose of 0.05 M.U. of penicillin intramuscularly every 2 to 3 hours together with two to three injections of penicillin (0.005 M.U.) in the bubo every 6 to 8 hours and orally sulpha drug (sulphadiazine and sulphathiazole each 0.25 gm.) every 4 hours for a period of 48 hours cures an ordinary case of chancroidal bubo. In the earliest sign of buboes when the inguinal gland has not been appreciably enlarged in size but there is only pain on walking and tenderness to touch penicillin therapy has aborted the bubo in a lot of cases in 24 hours. In an advanced case the dose of penicillin-sulpha-drugs are prolonged for 72 hours. The same dose of penicillin sulphonamide is helpful in bubo with chancroidal sore (Lahiri, 1946c).

Follow-up of every case of chancroidal bubo by serological examination every three months for a period of 2 years is essential to eliminate asymptomatic latent syphilis.

Conclusion

Every case of bubo should be treated with penicillin-sulpha-drug therapy.

Acknowledgment

My thanks are due to Dr. Nawab and Major Sinha for their encouragement and discussion with penicillin therapy in venereal diseases.

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CUTANEOUS GUMMATA OF FACE

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WHEN syphilis is not treated in the early stage the patient tries to establish a balance between the body's defence and the *T. pallidum*. Thus a state of latency occurs when the number of organisms get reduced and the tissue reaction of the patient also is somewhat changed. Eventually a state of *allergy* is established. This allergy is responsible for the infiltration of the tissue with lymphocytes, plasma cells and epithelioid cells and also obliterative endarteritis of the small vessels, resulting in the reduction of the blood supply and ultimate necrosis. Any part of the body may be affected by syphilis and the present paper deals with cutaneous gummata of face.

Occurrence after infection of the condition is very variable and may be at any time of the patient's life, and is usually from 3 to 5 years after infection in India.

Types are mainly of two different types, such as (1) nodular and (2) nodulo-ulcerative types.

Spread.—In late syphilis the spread is generally centrifugal. The new nodules always form outside the circle and heals up at the centre with parchment-like scar. There is sometimes pigmentation. The lesion is polymorphic in character.

Early syphilitic lesions of the face like extra-genital chancres on lips, nares and other places on the face are rare in India and have been estimated to be only 10 per cent of all cases of extra-genital chancres (Lahiri, 1945a).

Late syphilitic lesions of the face are quite common in India and form about 27 per cent of all cases of late syphilitic lesions of the body (Lahiri, 1945b).

The nodular syphilitic rash on face (figure 1, plate XXII) is quite common and the patients are not infrequently treated as sycosis barbæ by mistake. The hyperkeratotic rash of secondary syphilis or as it is now called nodular late recurrence on face (figure 2, plate XXII) is also seen in India and is generally stamped as due to *B. hansenii* due to the resemblance to leonine face of leprosy. There may be a solitary gumma of the lip which is quite common in India and has a characteristic indolent induration which seldom escapes notice and is hardly mistaken. Sometimes multiple nodular gummata are found on the face. Some of these nodules go on to ulceration. These ulcers when coalescing give rise to the picture of lupus vulgaris of face. In some cases the nose may be destroyed and the nares may be closed and the lips may be destroyed and united, leaving only a hole of about 1/10th inch in diameter (figure 3, plate XXII). In another type which is very common there is destruction of the skin on the bridge of the nose together with destruction of the underlying bones (figure 4, plate XXII). These are the common cases in every hospital in India. A very rare type of cutaneous gummata of the face that has been observed is associated with the rhino-pharyngitis mutilans called gangosa (figures 1 to 5, plate XXI, I.M.G., September, 1947).

Observation.—All these five cases had history of ulcer penis following on sexual contact; positive serology (WR and Kahn). Levaditi's stain in biopsy from case 5 did not show *T. pertenue* and skiagram showing destruction of the nasal septum, palate and parts of maxilla (skiagram, lateral and P-A views) with evidence of rarefaction and new bone formation at the lower end of tibia (skiagram, lateral and P-A views of the right leg). Cases 1 and 2 were treated both with heavy metals and also with penicillin with very good results (Lahiri, 1947). Case 3 was treated in the surgical department from where it was referred and the rest were treated with heavy metals but the case of gangosa never came for plastic operation after the routine heavy metal therapy.

Conclusion.—It has yet to be found out why syphilis produces destruction and mutilation of the face in a particular individual. Besides free compulsory treatment for every syphilitic in India, a very well-organized India-wide anti-V.D. drive should be instituted to save the millions in India from crippling, blindness, dumbness, infant mortality and unhappiness.

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A STUDY IN THE PREVALENCE OF VENEREAL DISEASE IN INDIA JUDGED FROM A SERIES OF ROUTINE KAHN TESTS AND FROM HISTORIES IN SANATORIUM PATIENTS

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MANY statements are seen as to the prevalence of venereal disease in India, some based on the number of such patients attending dispensaries or admitted to hospital wards, but most of them on general impressions based on little scientific evidence. It was thought that a contribution to our knowledge might be made by a study of a large series of routine examinations on patients who have come to the sanatorium at Arogyavaram, Madanapalle, all of whom were suffering from or suspected to be suffering from tuberculosis, and none of whom came because they thought they were suffering from venereal disease.

Material

The study originally included 8,211 patients admitted from June 1927 when the senior writer introduced the Kahn test at Arogyavaram until 30th June, 1947, but this number was subsequently reduced to 7,221. The reason for this was that the study showed that there was an unusually high number of weak reactions in the Kahn test carried out from 1927 to 1929; during this period a locally made antigen was used, and when a commercially prepared antigen was

employed about 1930 the number of weak reactions dropped abruptly and has since remained constant. We consider it therefore right to omit the 862 patients from the earlier years from our study and confine ourselves to the patients admitted since 1930. A further 128 patients were omitted either because they were re-admitted during the same year or because their stay was too short for a proper examination to be made as they left the day of admission or the following day.

In addition to patients in the sanatorium we have included a series of routine Kahn tests done on children and young adults in school hostels in the Chittoor and North Arcot districts of the Madras Presidency.

In the study of the patients the Cope Chat card system was used, and the details taken from the patients' clinical records included sex, age, marital status, community, province, occupation, diagnosis of tuberculous or non-tuberculous disease, and the history with regard to venereal disease given by patients on admission.

Of the 7,221 patients studied, the Kahn test was done in 6,324 and was not done in 897, many of these being patients who had been previously admitted and who returned for a check-up or were re-admitted and the Kahn test was not repeated. There was no selection of cases omitted and they occur in all groups and classifications studied. The percentage of omitted Kahn has gradually been reduced until in 1947 it has been only 2.5 per cent.

The antigen used for the tests has been Messrs. Parke Davis' Kahn standard antigen except for a very short period during the war when 10 c.c. of an antigen made in India was used. This local antigen was satisfactory but a second batch from the same place had to be discarded as it gave precipitation in all titrations tried. The Parke Davis antigen seemed good throughout the whole period.

General results of Kahn test

The general results of the Kahn test are shown in table I. The figures are grouped in 5-year

TABLE I
General results of Kahn reaction

Kahn reading ..	1930-34	1935-39	1940-44	1945-47	Total
Negative ..	1,151	1,512	1,741	932	5,336
± ..	118	91	87	44	340
+ ..	66	51	69	44	230
++ ..	45	59	32	34	170
+++ ..	23	28	33	16	100
++++ ..	30	46	48	24	148
	6.8%				6.6%
Total ..	1,433	1,787	2,010	1,094	6,324
No Kahn ..	310	277	220	90	897
Total patients ..	1,743	2,064	2,230	1,184	7,221

periods in order to show if there is any change in the general results since 1930; the Kahn readings are the usually accepted readings based on the average of the 3 tubes. The percentage has been calculated for the definitely positive readings, but not for the minor reactions although in some cases these may be of significance.

It will be seen from table I of the 6,324 patients that the percentage of positives was 6.6 for the whole period, and that there is little variation in the different 5-year periods, the highest being 7.4 per cent in the 1935 to 1939 period and the lowest 5.6 per cent in the 1940 to 1944 period. The question arose whether this difference was of any significance, and in an examination of the percentages in the various years the following was found:

TABLE II

Year	Per-centage of positives	Year	Per-centage of positives	Year	Per-centage of positives
1935	7.1	1940	4.3	1945	6.3
1936	10.5	1941	4.8	1946	7.8
1937	7.3	1942	5.8	1947 (†)	5.6
1938	7.0	1943	6.2	..	..
1939	5.5	1944	6.7	..	..

Table II shows a gradually decreasing percentage of positives during the pre-war years with its lowest in the first war year. Thereafter there is a gradual rise. Does this reflect a real change in the general infection rate during the war? Admittedly the figures for the tests in each year are small, varying from 331 to 447, but the question is prompted by the smoothness of the curve if the percentage were put in a graph form.

Sex

In order to examine if there is any difference in the figures for men and women, the results are analysed as in table III.

From table III it will be seen that the average Kahn positive for males is 7.1 and for females 5.3, and except for one year in the 1935-39 group the difference is fairly constant and the percentages for females show the usual small variations from year to year which would be expected. In 1936 out of 108 women 17 gave a positive Kahn (15.7 per cent), the only year in which the percentage of positives for women was higher than that for men. This unexpectedly high number, admittedly in a small series, influenced the figures for the whole 5-year group. When an examination was made of the figures for the individual years from 1935 no smooth curve was found for either men or women separately as was found for both together, although for both sexes the lowest figure was reached in 1940, 5.2 per cent for men and 2.5 per cent for women.

TABLE III
Sex and Kahn reaction

Kahn reading	1930-34		1935-39		1940-44		1945-47		Total	
	Male		Male		Male		Male		Male	
	No.	%	No.	%	No.	%	No.	%	No.	%
Negative	804	..	1,074	..	1,222	..	682	..	3,782	..
+	80	..	61	..	59	..	33	..	233	..
++	53	..	42	..	54	..	31	..	180	..
+++	32	..	42	..	27	..	28	..	129	..
++++	19	..	24	7.4	23	6.3	15	7.8	81	7.1
+++++	25	5.2	28	7.6	40	6.3	20	7.8	113	7.1
Total	1,013	..	1,271	..	1,425	..	809	..	4,518	..
Female			Female		Female		Female		Female	
No.			No.		No.		No.		No.	
347			438		519		250		1,554	
38			30		28		11		107	
13			17		15		13		50	
13			9		5		6		41	
4			4		10		1		19	
5			18		8		4		35	
420			516		585		285		1,806	
Total			Total		Total		Total		Total	
1,013			1,271		1,425		809		4,518	

The curve is therefore probably of little or no significance.

Age

The Kahn results were then considered according to age, and for this purpose those below 15, that is, in general below puberty, were taken as one group, from 15 to 19 years as another group, and thereafter groups of 10 years. In the group of 50 years and above are included 17 men and 2 women of 60 years of age or more. As the examination of the 5-year periods has shown that there is not much change in the different periods this grouping has been dropped for subsequent analyses, specially as the subdivisions would become very small and percentages of little value. The results for the age groups for the whole series are given in table IV.

It will be seen from table IV that in the small series of pre-puberty patients the positives are very low, 3.4 per cent for boys and 1.7 per cent for girls, with an average of about 2.5 per cent. As no special examinations were made for marks of hereditary syphilis, it is not possible to say at this stage whether this percentage indicates an inherited infection. The same low figure is found in the 15 to 19 year female group, namely, 2.0 per cent, but the male percentage has increased to 6.8 per cent. From 20 to 39 years of age the positives for the two sexes are about equal, the percentages in the 30-year group being higher than in the 20-year group, and from 40 years of age onwards the percentages for males are higher than those for females.

Marital status

The Kahn reaction in relation to marital status is shown in table V.

From table V it will be seen that the positive Kahn percentage for unmarried women remains low, namely, 2.7 per cent, but slightly higher than the average (2.0 per cent) for the age groups up to 20 years of age in which the majority of unmarried women fall. That for unmarried men is 6 per cent, just a little below the percentage for all males under 20 years of age which would work out at 6.4 per cent. Both sexes have a higher positive percentage in the widowed state, for men 14.4 per cent and for women 11.1 per cent, but the figures are not large.

Community

In order to see if there was any variation in the Kahn positive percentages in the different communities, the figures were analysed according to community as shown in table VI. The divisions made were Hindus, Muslims, Indian Christians, Anglo-Indians, Europeans and others, this last group including Burmans, Chinese, Sinhalese and a few Armenians and Asiatic Jews. Some Indians whose domicile was not normally in India were included in their community group.

From table VI it will be seen that there is little difference in Hindus, Muslims and Indian

TABLE IV
Age group and Kahn reaction

Kabn reading	-15		15-19		20-29		30-39		40-49		50-	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
Negative	53	48	335	299	1,705	754	1,054	329	477	99	148	25
±	2	8	13	24	104	48	79	18	26	6	9	3
+	1	2	20	13	78	23	54	8	20	4	7	0
++	1	0	20	3	43	22	43	13	18	2	4	1
+++	1	0	4	1	25	8	25	8	20	1	6	1
++++	0	1	3	3	43	17	41	11	20	3	6	0
Total	58	59	395	343	1,998	872	1,306	387	581	115	180	30

TABLE V
Marital status and Kahn reaction

Kahn reading	SINGLE		MARRIED		WIDOWED	
	Male	Female	Male	Female	Male	Female
Negative ..	1,546	494	2,162	993	74	67
± ..	80	40	149	64	4	3
+ ..	71	14	104	34	5	2
++ ..	53	7	70	32	6	2
+++ ..	25	3	52	14	4	2
++++ ..	31	5	78	25	4	5
Total ..	1,806	563	2,615	1,162	97	81

Christians, the figures for Muslims being slightly higher than the others. The European group has lower figures, only 3 men and 1 woman being found positive of 162 patients. The men in 'Others' show 12.0 per cent positive, the highest figure in all the groups.

Province

The figures analysed according to the domicile of the patients are shown in table VII. As was to be expected from the situation of the sanatorium, the majority of patients came from Madras Presidency, 54 per cent, the next largest series was from the Indian States, mostly the South Indian States of Travancore, Cochin, Mysore and Hyderabad. As the numbers proved to be small from the North and Central Indian Provinces, except Bengal, they have been grouped together. Non-Indian domicile was mostly Ceylon, Burma and Federated Malaya States.

given by the patient and where there were large groups figures are given separately even though some of these might be of the same general social status as some of the general groups. Of course, occupation is not a reliable guide to social status as 'students' include patients from all social ranks, and a 'merchant' may vary from a petty shopkeeper to a merchant prince. Occupations with smaller numbers are grouped, such as artisans which includes many trades requiring some technical knowledge below administrative rank. Professional classes include lawyers, businessmen, Government servants of gazetted rank, missionaries and many others and in this group we also include the smaller group of 'upper' classes, zemindars and others. If a woman had no occupation of her own, she is classified under that of her husband or guardian.

From table VIII it will be seen that the highest percentages of positives were found in

TABLE VII
Provinces and the Kahn reaction

Kahn reading	Madras	Bombay	Bengal	Indian States	Other Provinces	Non-Indian	Total
Negative ..	2,829	115	643	1,239	242	268	5,336
+ ..	179	7	41	87	14	12	340
± ..	134	4	25	57	5	5	230
++ ..	104	2	16	36	2	10	170
+++ ..	59	1	14	14	4	8	100
++++ ..	101	2	10	26	1	8	148
Total ..	3,406	131	749	1,459	268	311	6,327

The positives for Madras are slightly higher than all the other figures except the non-Indian domicile and this last group includes the high figure for non-Indians. The figure for North and Central India and Bombay are low, namely, 2.7 per cent and 3.8 per cent.

Occupation

The Kahn reaction and occupation which also give some indication of social status have been studied in table VIII. 'Occupation' was that

the police, namely, 16.3 per cent, the next highest in the artisan group, 11.6 per cent, and cultivators, landlords, servants and coolies were all above the general average of 6.6 per cent. The lowest figure was for doctors and nurses, but whether this is due to less infection or facilities for diagnosis and treatment if infection has been incurred, cannot be ascertained. The figure for students, namely, 4.4 per cent, is low and perhaps is to be explained by the age of the group mostly below 20 and also that in the group are included

TABLE VI
Community and Kahn reaction

[illegible]

TABLE VIII
Occupation and the Kahn reaction

Kahn reading	Students	Merchants	Artisans	Cultivators	Landlords	Professional classes	Doctors and nurses	Teachers	Clerks	Police	Servants	Coolies
Negative	879	770	413	505	173	787	265	410	718	117	119	180
±	46	49	27	25	13	52	17	21	58	14	7	11
+	38	29	18	25	8	32	7	15	32	13	6	7
++	26	27	20	13	5	19	7	11	18	12	3	9
+++	9	11	14	16	6	12	1	7	15	3	4	2
++++	8	19	26	18	4	16	4	8	19	13	6	7
Total	1,006	905	518	602	209	918	301	472	860	172	145	216

a considerable number of unmarried girls and young women (see tables IV and V).

Tuberculosis and other diseases

The Kahn results were next analysed in relation to the tuberculosis or other diseases from which the patients were suffering (see table IX). The groups taken were pulmonary tuberculosis (sputum positive and sputum negative); non-pulmonary tuberculosis; other pulmonary diseases such as bronchitis, asthma, lung abscess, bronchiectasis, non-tuberculous pneumonia and non-tuberculous pleurisy, tropical eosinophilia; other diseases which included heart disease, malaria, and a miscellaneous group in which the diagnosis was syphilis, malignant disease or other disease; and a group in which no active tuberculosis or other disease was found.

elicit and therefore the figures given in the analysis in no way are claimed to represent the real position. Even where a history of venereal disease was given, it was only rarely supported by information as to any misconception or serological examinations; so the possibility of mistake is not excluded. Histories such as 'doubtful' and swelling of the inguinal glands are classified as 'doubtful'. In women a history of repeated abortions, miscarriages and early infant deaths have been classified under 'doubtful', but one or two abortions or miscarriages have been ignored. Only two women in the whole series gave a history of venereal disease, namely gonorrhœa. This investigation is shown in table X, where 897 patients who had no Kahn test have also been included, making a total of 7,221 patients.

TABLE IX

Tuberculosis and other diseases and the Kahn reaction

Kahn reading	PULMONARY TUBERCULOSIS		Non- pulmonary tuber- culosis	Non-tuber- culous pneumonia and pleurisy	Bronchitis, asthma, lung abscess, bronchi- ectasis	Tropical eosinophilia	NON- TUBERCULOUS DISEASE			No active disease				
	T.B. +	T.B. -					Heart disease	Malaria	Miscellaneous					
Negative ..	4,025	511	164	38	97	103	10	12	27	349				
± ..	263	43	6	2	4	11	1	0	0	10				
+ ..	180	20	7	3	1	5	2	1	3	8				
++ ..	135	13	2	4	1	11	0	0	4	3				
+++ ..	72	12	1	1	0	6	1	0	4	4				
++++ ..	113	7	5	2	1	5	0	0	9	3				
	6.7%		5.3%		4.8%		14.3%		2.0%		15.6%		2.7%	
Total ..	4,788	606	185	50	104	141	14	13	47	377				

The sputum plus cases show a Kahn positive rate of 6.7 per cent. The highest percentage, namely 15.6 per cent, was found in the tropical eosinophilia; 14.3 per cent was found in the small group of non-tuberculous pneumonia and pleurisy. Only 2 per cent Kahn positive was found in the bronchitis, asthma, lung abscess and bronchiectasis group. Low figures 2.1 per cent were also found in the group with no active disease. The number of positives in the miscellaneous group, 17 out of 49, is high because the final diagnosis of the disease producing the symptoms for which the patient came for treatment was syphilis in 16.

History of venereal disease

On admission of the patient a medical history is taken by the doctor on duty. The guiding notes on the case sheet include venereal disease, but it is probable that in a great many cases no questions were asked about venereal disease, and in this study, absence of any information in the history is taken as no history. A history of venereal disease is often notoriously difficult to

Table X shows that of the total number of patients 1.2 per cent gave a history of syphilis only, 0.7 per cent of syphilis and gonorrhœa and 2.5 per cent of gonorrhœa only, a total of 4.4 per cent. A doubtful history was given in 0.9 per cent, 0.6 per cent accounted for by repeated abortions and 0.3 per cent for other reasons. Of 130 patients who gave a history of syphilis, with or without gonorrhœa, 44 or 33.8 per cent gave a positive Kahn and 12.3 per cent with minor reactions; of 157 patients who gave a history of gonorrhœa, 23 or 14.7 per cent gave a positive Kahn and 21 or 13.4 per cent a doubtful Kahn. Of 38 patients with a history of repeated abortions, 8 gave a positive Kahn as did 7 of 21 other patients with a doubtful venereal history. Looking at the figures in another way, of 418 patients with a positive Kahn, 44 or 10.8 per cent gave a history of syphilis and 23 or 5.5 per cent of gonorrhœa alone. Of 5,336 patients with a negative Kahn, 70 or 1.3 per cent gave a history of syphilis. Of 5,974 patients with no history of venereal disease, 336 or 5.6 per cent had positive Kahn and 523 or 8.8 per cent doubtful Kahn.

TABLE X
History of venereal diseases and Kahn reaction

Kahn reading	Syphilis	Gonorrhoea	Abortions, etc.	Doubtful	No venereal disease	Total
Negative	70 (30)*	113	21	13	5,119	5,336
±	6 (2)	5	4	1	324	340
+	10 (3)	16	5	0	199	230
++	14 (3)	6	2	4	144	170
+++	16 (3)	6	2	1	75	100
++++	14 (8)	11	4	2	117	148
Total with Kahn test ..	130 (49)	157	38	21	5,974	6,324
No Kahns	8	23	4	1	861	897
Total patients	138	180	42	22	6,835	7,221
Percentage of all patients ..	1.9	2.5	0.6	0.3	94.7	100

*The figures in brackets indicate the number of patients with a history of both syphilis and gonorrhoea.

Repeated Kahn tests

In order to check a positive Kahn or even a negative sometimes, the test was repeated in a number of patients. Also in a considerable number of positive patients treatment was instituted without a further check although frequently a Kahn test was done during the course of treatment. Only one repeated Kahn test for a patient is shown in the table even if several were subsequently done. The results of the repeated Kahn are shown in table XI.

6 became +++++, 4 became ++ without treatment; of 63 +++++ Kahn, 4 became +++ without treatment. None of the +++ and +++++ Kahn became negative or doubtful without treatment.

Routine Kahn tests in school children

As mentioned earlier a series of routine Kahn tests were done on children in school hostels mostly Christians in certain schools and training schools in the Chittoor and North Arcot

TABLE XI
Repeated Kahn tests compared with original test

Original Kahn reading	REPEATED READING												Total
	Same	Negative		±		+		++		+++		++++	
		Treatment	No treatment	Treatment	No treatment	Treatment	No treatment	Treatment	No treatment	Treatment	No treatment		
Negative ..	94	..	..	..	1	..	..	..	3	..	..	..	98
± ..	4	..	8	..	..	..	..	..	..	..	1	..	13
+ ..	1	..	8	..	..	..	..	..	3	..	..	1	13
++ ..	7	3	5	..	1	1	4	..	3	..	4	..	26
+++ ..	8	8	..	6	..	3	..	2	4	..	..	6	34
++++ ..	27	3	..	7	..	3	..	8	..	11	4	..	63

From table XI it will be seen that of 98 negatives retested, 3 gave a ++ positive and one a ±. Of 13 ± tests, 8 were negative on retesting and one +++. Of 13 + tests, 8 became negative, 3 ++ and 1 ++++ on retesting. Of 26 ++ tests, 5 were negative on retesting without any treatment, 5 gave a stronger Kahn and 5 a minor reaction. Of the 36 +++ Kahn,

districts. Altogether 1,520 tests were done, including a few teachers. The findings are given in table XII.

Of the total number of positives, namely 64, 28 were over 15 years of age, above puberty, 19 males and 9 females: 2 of the males were teachers, and another, a man, admitted infection, in one case a married student and his wife were

TABLE XII

Routine Kahn tests on school children and young students

Total number ..	1,520
Kahn negative ..	1,226
± ..	161
+ ..	69
++ ..	33
+++ ..	16
++++ ..	15
	4.2%

both positive. Therefore, it is probable that hereditary syphilis, assuming the Kahn test to denote syphilitic infection, is considerably less than 4.2 per cent indicated. The number of positives varied considerably in the different schools, in some being nil, and in one as high as 14.3 per cent of 63 boys—only 2 of these positives were 15 years of age, the rest younger.

Discussion

Having now completed the general analysis of the figures, the question arises as to the interpretation of the Kahn test in relation to syphilitic infection.

One of the most recent surveys in the evaluation of serological tests for syphilis is that of the Committee of Evaluation of Serodiagnostic Tests for Syphilis following the Washington Serology Conference in 1941 under the auspices of the United States Public Health Service (Gradwohl, 1944). Two diseases only are singled out as liable to give a positive Kahn test apart from syphilis, namely leprosy and malaria. In our series only 1 patient was noted as suffering from leprosy and he had a negative Kahn and 13 patients were diagnosed as having malaria only and one only had a ± Kahn. The Committee regarded the Kahn test as 100 per cent specific in all other diseases tested including a series of tuberculous patients of all stages of the disease. Evidence has however been published elsewhere from time to time of a transitory positive Kahn in certain types of bronchitis and pneumonia although these are not numerous. In our series we had a number of patients with non-tuberculous chest diseases and in some of these we did get a higher percentage of positives, namely, in tropical eosinophilia 15.6 per cent. The finding of a higher percentage of Kahn tests in cases of tropical eosinophilia than in a general series was pointed out by Fridmott-Moller and Barton (1940) in a series, part of which is included in our present series of routine tests. Menon (1945) recorded that a positive Wassermann with a doubtful or negative Kahn was a common finding in tropical eosinophilia, and D'Abrera and Stork (1946) agreed with him. Our series was not controlled by the Wassermann but we did get a much higher percentage of positives in the tropical eosinophilia, 15.6 per cent as compared with the general

average of 6.6 per cent. Also in a small series of non-tuberculous pneumonia and pleurisy, we found 14.3 per cent positive Kahn. It is possible that the positive reaction in some of these was not due to syphilis: One case diagnosed as yaws gave a positive reaction.

On the other hand, a negative Kahn test is not proof of the absence of syphilitic infection. The Committee's report referred to give it as 62.2 per cent specific in patients with various degrees of syphilis treated and untreated—in this it is about the same as most of the other tests reviewed including Wassermann.

Previous reports in India of routine investigations into the question of latent syphilis have mostly been carried out with the Wassermann test and not with the Kahn test. Greval, Sen Gupta and Das (1938) reviewed earlier work in which Iyengar (1919) found 22 per cent of a series of 400 Indian males positive, and Lloyd, Napier and Mitra (1930) found about 20.0 per cent positive. Their own conclusion was that the corrected positive Wassermann rate should be under 10.25 per cent, that is after omitting certain non-syphilitic cases which gave a positive reaction; for Europeans, they estimated it should be under 8 per cent. Subsequently, Greval and Sen (1942) modified this figure and came to the conclusion that the crude rate was under 8.7 per cent and the corrected rate under 5.3 per cent.

In our series of cases we did not get the type of case which Greval and his co-workers found to produce a non-syphilitic positive Wassermann, except the tropical eosinophilia and non-tuberculous pneumonia series, a small group compared with our large series of figures for the tuberculous patients.

Our series has a possible disadvantage in that all positives were not controlled by a second test, but when retesting was done, no +++ or ++++ Kahn was found to become negative or doubtful without treatment. A small number of the ++ reactors became negative or doubtful without treatment, but these are balanced by some negative and doubtful Kahn which later proved to be positive. Therefore the omission of retesting for all our sera giving a Kahn reaction doubtful or positive probably does not affect our general conclusions.

Our figure of 6.6 per cent positive Kahns, taking this as indicating latent syphilis, is not very much higher than the 5.33 per cent of Greval and Sen for their Wassermann series.

It might be discussed as to how far our series is a fair sample of the population. Although no patients came because they thought they were suffering from venereal disease, yet there has been a certain unavoidable amount of selection in the cases which would make the series not fully representative of the whole population. The percentage of educated and more well-off patients is higher than would be found in the general population and specially is this true of the patients from the further parts of India. But nevertheless the series of patients does cover

a wide range of all classes of patients and different social status, occupations and religions, and national communities.

The evidence of inherited infection is that it is very low, both judged from the series of patients (table III) and the school children (table XII).

From what is known of the figures for latent syphilis from other workers, there seems to be ample evidence in our series to support the view that tuberculosis does not influence the Kahn reaction.

Summary

1. As a contribution to our knowledge of the prevalence of venereal disease in India, a study has been made of routine Kahn tests and of the medical histories of patients admitted to the sanatorium at Madanapalle since 1930.
2. Of 6,324 patients in whom the Kahn test was done the percentage of positives was 6.6.
3. The results have been analysed according to sex, age, marital status, community, province and occupation.
4. A history of venereal disease was given by 4.4 per cent of the patients.
5. The results of a separate series of routine Kahn tests on 1,520 school children and young students show 4.2 per cent positive, but some of the positives were above puberty.
6. The figures are discussed and compared with other work reported in India and found to be a little higher than the figures of Greval and Sen for the percentage of latent syphilitic infection.
7. Tuberculosis does not seem to influence the Kahn reaction.

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THE WASSERMANN POSITIVE RATE OF CASES FROM HOSPITALS AND VENEREAL CLINICS OF CALCUTTA IN 1939, 1943, 1944, 1945 AND 1947

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IN two previous papers in this journal (Greval and Roy Chowdhury, 1944; Greval, Roy Chowdhury and Das, 1945) the writers gave comparative figures for (i) a normal pre-war period in 1939, (ii) a period during the war before the commencement of the anti-venereal drive in Calcutta in 1943, (iii) a period after the commencement of the anti-venereal drive in 1944, and (iv) a period when the drive had passed its peak in 1945. To these they now add figures for 1947, from hospital cases only.

Previously the writers, basing the presumption of a recent infection of syphilis on a +++ reaction, concluded that there was no increase in the incidence of syphilis in Calcutta. The number of positive cases had increased because the population had increased. The increase was proportionate. It is more than probable that a relative decrease might have been recorded but for the publicity of the anti-venereal drive. They also concluded that as the incidence rate was constant the source of infection must have remained constant. The number of the infected women was probably the same only their clientele had increased. The view fitted into their housing and rationing difficulties during the period under consideration. They, further, observed that there was a definite decrease in the intensity of the +++ reaction. This in all probability was due to the free treatment.

Observation on the figures and associated considerations

The +++ reaction.—This is the reaction given by the syphilitic sera with uncholesterinized Wassermann reaction antigen. Typically, it is the reaction of recent untreated cases of secondary syphilis.

Cases selected for Wassermann reaction.—With the exception of a small hospital all the hospitals in Calcutta and even the V.D. Clinics select cases for the Wassermann reaction. The positive rate, therefore, is of a suspected population, not of a random sample. It is not the rate for Calcutta as a whole.

From table I it will be seen that on the whole the positive rates have remained of the same order from 1939 to 1945. The strongly positive rate for the hospitals (as opposed to the V.D. Clinics) this year is the lowest on record in Calcutta since

1939. This may be due to the free treatment of syphilis before hospitalization or to the general trend towards decrease of the incidence of the disease in Calcutta due to increase in the hardships of life. The senior writer believes that syphilis in Calcutta is declining and was never really a menace as it has been made out to be.

The introduction in Calcutta of new strains of the spirochæte from the other hemisphere, during the war, was likely. They have not increased the total incidence of syphilis. Whether, as another result, neurosyphilis will appear (or increase if the present negligible figure is taken account) in due course, remains to be seen. The

TABLE I

Showing the Wassermann positive rate of cases from hospitals and venereal clinics of Calcutta in 1939, 1943, 1944, 1945 and 1947

Periods	Number of cases tested	POSITIVE REACTIONS, ALL GRADES (+, ++ AND +++)		STRONGLY POSITIVE REACTIONS (+++ ONLY)	
		Actuals	Percentage of the total	Actuals	Percentage of the total
<i>In 1939 :</i>					
I. 11-4-39 to 8-5-39, 15 working days	1,000	146	14.6	55	37.7
II. 9-5-39 to 3-6-39, 16 " "	1,000	204	20.4	57	27.9
<i>In 1943, before the anti-venereal drive :</i>					
III. 2-1-43 to 23-2-43, 34 working days	1,000	235	23.5	91	38.7
IV. 23-7-43 to 29-8-43, 25 " "	1,000	275	27.5	51	18.5
<i>In 1944, after the anti-venereal drive :</i>					
V. 22-2-44 to 13-3-44, 13 working days	1,000	337	33.7	121	35.9
VI. 14-3-44 to 30-3-44, 10 " "	1,000	351	35.1	104	29.6
<i>In 1945, after the anti-venereal drive had passed its peak :</i>					
VII. 6-3-45 to 16-3-45, 8 working days	1,000	229	22.9	47	20.5
VIII. 19-3-45 to 29-3-45, 8 " "	1,000	221	22.1	46	20.8
IX. 25-6-45 to 10-7-45, 7½ " "	1,000	242	24.2	87	35.9
X. 12-7-45 to 20-7-45, 7 " "	1,000	255	25.5	87	34.1
XI. 1-8-45 to 10-8-45, 9 " "	1,000	253	25.3	85	33.5
<i>In 1947, from hospitals, as opposed to anti-venereal clinics, comparable to figures in 1939 and 1943 :</i>					
XII. 24-4-47 to 23-6-47, 23 working days	1,000	250	25.0	35	14.0
XIII. 23-6-47 to 9-9-47, 15 " "	1,000	213	21.3	23	10.8 (approx.)

TABLE II

Showing the ratio of new and old cases at different periods

Hospitals	Period	TOTAL NUMBER OF CASES		Ratio of new to old cases
		New	Old	
Medical College V.D. Clinic ..	V and VI	1,566	5,143	1 : 3.28
	VII and VIII	940	9,668	1 : 12.85
	IX	338	2,038	1 : 6.02
Campbell V.D. Clinic ..	V and VI	..	..	1 : 3.0
	VII and VIII	..	..	1 : 6.0
	IX	..	..	1 : 5.0
Lady Dufferin V.D. Clinic ..	V and VI	218	606	1 : 2.77
	VII and VIII	119	1,510	1 : 12.68
	IX	112	999	1 : 8.91

Two conclusions emerge : (1) the apparent vagaries of periods marked VII and VIII are due to more treated cases being tested in these periods than in others,

(2) the new cases have decreased markedly and steadily.

This fact is not in favour of the increased incidence of syphilis in Calcutta during the period.

presumption is that it will not appear. The static population of the town was hardly in touch with the mobile population, in spite of the total nature of the war. Besides, the identity of a neurotropic strain has not really been established.

The figures have been collected serially from the register in batches of 1,000, with a view to bringing out the usually occurring differences between batches of this magnitude.

The apparent vagaries of periods marked VII and VIII were enquired into with respect to the ratio between the new and old cases. The results are given in table II.

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SEROLOGICAL TECHNIQUE (contd.)

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False LCF (WR) Reactions

False positive reactions.—The following conditions have been held responsible for a false positive reaction: (1) Other diseases—leprosy, yaws, malaria, dengue, trypanosomiasis, pinta, bejel and atypical pneumonia frequently; septicaemia, endocarditis, pneumonia, tuberculosis, relapsing fever, spotted fever, typhus fever, scarlet fever, infectious mononucleosis, pernicious anaemia, leukaemia, xanthomatosis, severe jaundice and lymphogranuloma inguinale less frequently; other morbid states very infrequently. (2) Bacterial growth in serum. (3) Excess of fat and digestive products in serum. (4) Passive transfer from the mother. (5) High barometric pressure. (6) Improperly prepared, titrated and mixed reagents. (7) Probably some 'cured' cases of syphilis. Item 6 may be eliminated. It has no place in a standardized and controlled technique.

Attention has been drawn by the author to three other conditions: (1) Kala-azar. Some cases give an undoubted positive reaction which disappears when the disease is cured. (2) Leucithinophile eosinophilia. Many cases of asthma and other allergic conditions showing a marked eosinophilia also give a positive reaction which increases and decreases with the symptoms. (3) Leucithinophile hepato-gastro-intestinal syndrome. It is a state of ill health (i) characterized by chronic indigestion, distension after food, looseness of bowels or constipation, enlargement of liver with or without jaundice, discomfort or diffuse pain in the epigastrium or right hypochondrium, low fever, loss of weight, anaemia and a positive or doubtful

LCF and (ii) not covered either by a definite diagnosis of a known disease of the digestive system or by a diagnosis of syphilis. All the signs and symptoms may not and usually do not occur together. A strong enough combination in the absence of the usual manifestations of syphilis, however, establishes the presumption that one is not dealing with intentionally concealed, naturally latent or congenital syphilis but with a chronic and hitherto undescribed disease or disorder of the digestive system. The presumption is converted into proof when the positive or doubtful reaction weakens and disappears with the improvement and re-appears with the relapse. The condition is not syphilitic. The positive or doubtful LCF is false.

Latterly a post-vaccination period of 4 months has also been held responsible for simulating reactions of syphilis. These false reactions appear to be obtained mostly with flocculation tests. Immunization with tetanus toxoid also interferes.

False negative reactions.—Weak or even negative reactions of the blood in early and late syphilis are well known. What is not so well known is that for no apparent cause the bloods of thirty per cent of the patients slowly revert to negative, even though they may show definite signs of syphilis during this period: hence the specially sensitive antigens used for clinically known cases. An error on the right side resulting in such cases being reported 'doubtful' or even 'weakly positive' will suggest to the clinician the need for a thorough examination of the nervous and the cardiovascular system.

The New Name for the Wassermann Reaction, Lecithin Complement Fixation (LCF)

The original technique of the reaction was materially different from the present techniques. It depended upon the use of a restricted quantity of the haemolyticamboceptor and an excess of the complement: it was a qualitative test. The present-day techniques of most workers in England and America depend upon the use of an excess of theamboceptor and a restricted quantity of the complement: they provide a quantitative test. In America the reaction has been re-named after the serologists who have introduced the modification. The author suggested several years ago that it should be re-named Lecithin Complement Fixation (LCF). The name which has been adopted in the Carmichael Hospital for Tropical Diseases, Calcutta, is particularly useful in the tropics (and elsewhere too in cases with tropical histories) in allaying the alarm caused by doubtful, '50 to 90 per cent positive' and even positive Wassermann reactions. Diseases other than syphilis can undoubtedly be responsible for the reaction in the tropics.

The active substance in the antigen is presumed to be chiefly lecithin. It may be another allied lipid, or it may consist of several

lipoids. The letter L will represent one or more lipoids.

Repetition of LCF Reaction

1. Repetition necessary for diagnosis

When a suspicious primary lesion exists, and the first report is negative or doubtful.—If the treponema cannot be found, the reaction must be repeated fortnightly or weekly for 3 months from the date of the exposure. Diagnosis and treatment must be postponed. Otherwise the patient may have to submit to a lengthy treatment and life-long anxiety on suspicion alone.

If the risk has been taken with a partner who has later shown definite signs of primary or secondary syphilis, repeated clinical examinations and blood tests must be again continued for 3 months from the date of the exposure. Early primary lesions may be difficult to exclude in the female.

When a case of gonorrhoea has been treated with penicillin.—Observations, clinical and serological, may be necessary for 6 months.

When a case with equivocal signs of late syphilis has given a negative or doubtful reaction.—Further observations are obviously necessary, including blood tests. The fact that many syphilitics begin to give a negative reaction after a mere passage of time has been mentioned.

When syphilis of the nervous system is suspected.—The CSF is also to be tested with or after the blood.

When other conditions (febrile diseases in general, and certain tropical diseases in particular) known to give rise to a false positive LCF reaction are present.—These conditions have been mentioned. The reaction is repeated after they have abated.

When a treated woman has become pregnant.—The slightest departure from the negative reaction is important in the interest of the offspring, for those who do not treat every pregnant woman with a mere history of syphilis.

Women tolerate the disease much better than men, probably because of the chemical changes associated with the menstrual cycle and especially the changes associated with pregnancy. It has been noted that repeated pregnancies tend to cure the disease in women and to prevent serious nervous complications, especially if pregnancy occurs in the first few months of infection.

When a positive or doubtful LCF reaction has been found accidentally in an otherwise healthy subject, such as a donor of blood.—Latent syphilis must be excluded by further tests of blood and CSF.

The author's figures for latent syphilis in Indians, very much lower than those of other earlier workers, are :—

Crude rate (found initially)	8.7 per cent
Corrected rate (persisting finally, without anti-syphilitic treatment under	5.3 per cent

These figures were obtained from the Indian population of Calcutta not yet affected by the Second World War. In the country the rate must be much lower.

When a positive LCF reaction is not compatible with one's judgment of the patient's character or heredity.

2. Repetition necessary for treatment

When the blood is tested as a measure of the treatment.—A fall in the degree of fixation of the complement will indicate (i) whether the drug selected is making an impression on the system of the patient at all, and (ii) whether enough treatment has been given. Both indications are important: one may be dealing with conditions in which reaction and poisoning are feared and therefore the mildest remedies are used, as in cardiovascular disease, hepatic disease, advanced age and pregnancy: or one may be dealing with resistant cases and tough constitutions, and heroic measures may be needed.

Negative LCF at the end of a 'course' but after an 'interval' is the aim of treatment. Several courses may be necessary to attain this aim. Some extra treatment is then given.

Cases are known in which all treatment fails to influence the LCF. When after a long treatment, suitably given, the LCF reaction is still positive, suspension of further energetic treatment is justified if (i) the CSF is negative and normal and (ii) the cardiovascular system is sound or if (iii) the patient is elderly.

3. Repetition necessary for test of cure

When a cured case is being tested periodically.—The length of the intervals varies with the physician's confidence in his treatment and with the patient's financial status, from 3 to 6 months. The total duration of the periodical tests also varies with the purpose: 2 years after suspension of treatment, as a rule; 5 years after infection, for marriage (in the male, can be shortened by treatment to 4, *vide infra*); and whole life for general observations. The whole life repetitions may be annual.

As to the minimum period of subsequent observation, an analysis of the result of treatment of early cases at the St. Thomas' Hospital V.D. Centre, London, showed that by far the majority of relapses occurred within 6 months following suspension of treatment and that relapses were very uncommon in the second year and very rare after the end of 2 years. The minimum for early cases should, therefore, be 2 years.

The above remarks apply to blood only. The CSF also should be tested during the fourth and tenth year. The first is the end of the period when the changes found in the early syphilis have disappeared in a proportion of cases. The second examination is best calculated to catch those cases where the fluid, having been rendered normal, has relapsed.

The seasonal variations in the LCF reaction and in the quality of the complement of the guinea-pig serum on which so largely depends the degree of fixation are vital considerations. If possible, the repetitions should be made in the same season (or seasons).

The foregoing account was based on the result of the usual treatment with arsenic and bismuth. Opinion based on the results of treatment with penicillin cannot yet be given. After a 'course' of penicillin treatment the positive WR is not reversed as rapidly as after a course of the other treatment. The 'course' itself is as yet undefined. (The rapid method of treatment with arsenic and bismuth cannot be recommended.)

Certain Preparatory Measures

Food before giving blood.—The ideal time for giving blood for the test is early in the morning before taking any food. After that, any time before the heavy meal of the day (morning meal and lunch) will do. If this precaution has been ignored for the first test, it should be taken for the second and recorded.

Cloudy chylous sera are on the whole unstable, and more likely, therefore, to give a false positive (or doubtful) reaction.

Withholding a protein diet for 3 days.—A recent advance in the serology of syphilis advocates withholding all animal protein for 3 days before retesting the blood. The subject under test is put on a milk-free, meat-free diet, with fresh vegetables and fruit juices *ad lib.* and six to eight glasses of water daily for 3 days.

The author has tested this plan in a short series of cases, and in some Indian patients (strict vegetarians) withheld wheat and pulses also. He has obtained definite quantitative reduction and at times a qualitative change in the doubtful reactions of some cases. The plan may differentiate between specific and non-specific cases when clinical examination and history fail. It is worthy of trial.

Provocative injection.—The author is against the use of this measure. It is as likely to provoke a non-specific reaction as a specific reaction, and in India the causes of non-specific reactions are many. The provocative injection in the military hospitals has been given up in the diagnosis of early syphilis.

The Blood Test Obsession

Cases presenting themselves again and again for blood tests and also going for treatment from physician to physician are frequently encountered. Their attention should be drawn to the following facts and conclusions:—

1. *False positive LCF reactions are quite common in India.*—All conditions known to be responsible for them should be excluded before a lapse in the more or less remote past is accepted as the starting point of syphilis.

2. *Syphilis does not play the same havoc with the human body in India as in Europe.*—Late

and intractable effects of the disease are borne by very few victims indeed. GPI is a rarity against '500 to 700 cases treated yearly since 1927' in England. Tabes is almost as rare, at least the typical case. Cardiovascular diseases do exist but, excepting the aortic disease, their victims are found living useful lives, almost approaching the normal, with ease.

If syphilis in India were not so tame, the country, consisting as it does of masses whose buying power (including procuring of appropriate treatment) is so low, would not have shown such an increase in population at each census, even though the social conditions minimized the incidence of the disease.

3. *The possibility of the involvement of the nervous system and the cardiovascular system can be excluded by the detailed examination of the CSF and the heart.*

4. *A syphilitic male is not likely to infect his wife or offspring, 5 years after the infection, regardless of the treatment or cure, even in Europe.*—In India probably the same happy immunity is available earlier.

5. *A woman stands syphilis much better than a man, even in Europe.*—In India her chances of curing herself by her own biochemistry must be better.

6. *An infected expectant mother treated in the first half of the pregnancy can have a healthy offspring.*—Again, chances in India must be better.

DETAILS OF COMPLEMENT FIXATION IN GONORRHOEA

The Technique

The hæmolytic system.—This is taken from the LCF reaction, observing the same rule of preference for the complement.

The antigen.—A gonococcus vaccine containing 500 million organisms per c.c. and obtained from a manufacturing institute suffices. The author obtains his supplies, in 1 c.c. ampoules, from the Central Research Institute, Kasauli, and finds them satisfactory. The polyvalent character of the vaccines and the time taken in ampouling it have been described thus:—

'The seed of our gonococcus vaccine is selected to include six strains, if these are available at the time of preparation, but at least two strains are used for each brew.

The interval between washing and ampouling may vary, depending on supply and demand, from about one month to six months'.

The need for polyvalency in gonococcus suspensions for the purpose of this reaction has been overstressed. Even if evidence of several strains be admitted there remains *one very large main group* which is representative of the species. The strains are not comparable to the *type* of the meningococcus.

A 1 in 5 dilution of the contents of one ampoule from each batch of the vaccine is tested for anticomplementary and hæmolytic

activity. One volume of it should not interfere with 1 MHD of complement and 3 volumes should not hæmolyse 1 volume of the sensitized rbc suspension (details under LCF antigen).

The serum. 1. *Under test.*—It is inactivated immediately before use and diluted 1 in 5, 1 in 10, and 1 in 20. *If possible it should be taken in the laboratory from the patient:* otherwise it should be taken and preserved with special care and *not allowed to become anticomplementary.* The ideal time for taking blood is early morning before any food. After that any time before the heavy meal of the day will do.

2. *Known positive.*—A positive serum of known titre is diluted 1 in 5 with saline containing 0.25 per cent trikresol and kept in the refrigerator.

3. *Known negative.*—When a positive serum is available only 1 negative serum is enough as a control. Otherwise at least 6 controls, 3 from positive cases of syphilis and 3 found negative by LCF, are required. Serum from a subject with a bad throat (likely to harbour gram-negative cocci of the genus *Neisseria*) may also be included.

Charging of the tubes.—For each serum 4 tubes are used in a column and charged as follows:—

A Column

2nd, 3rd and 4th row tubes contain antigen 1 volume and complement $1\frac{1}{2}$ MHD contained in 1 volume.

4th row tube Serum dilution, 1 in 20, 1 volume.

3rd row tube Serum dilution, 1 in 10, 1 volume.

2nd row tube Serum dilution, 1 in 5, 1 volume.

1st row tube Serum dilution, 1 in 5, 1 volume, saline, 1 volume (no antigen).

(Antigen and complement are mixed and delivered as a double volume *after* the serum has been delivered)

Left (i) at room temperature $\frac{1}{2}$ hour, (ii) in incubator $\frac{1}{2}$ hour, (iii) at room temperature 5 to 10 minutes, until the tubes do not feel warm, (iv) in ice box for $\frac{1}{2}$ hour, (v) at room temperature for 5 to 10 minutes, until moisture does not condense on the tubes.

The order is important. If the tubes are left in the ice box first, anticomplementary action of some old sera becomes more marked.

Sensitized rbc 1 volume added to all tubes.

Incubation $\frac{1}{2}$ hour.

An antigen control is included for the day's work. It consists of (i) antigen 1 volume +, (ii) complement 1 MHD in 1 volume +, (iii) saline 1 volume. It is left at various temperatures in the same rack as the other tubes and tested for loss of complement by adding rbc suspension 1 volume. The rbc should be almost completely hæmolyzed.

Reading of results.—The results are read (i) immediately for \pm and —, and (ii) next day for + and T, after the tubes have stood in the ice box overnight. A ? is ignored and classed with — (details under LCF).

The positive and negative controls (at least the majority of negative controls) should give the expected reactions.

Record and report. 1. *When the serum control is fully hæmolyzed.*—A + recorded under its appropriate tube is reported as 'Positive in 1 in 20', 'Positive in 1 in 10' or 'Positive in 1 in 5'. A T or \pm in one or more tubes is recorded under each tube and reported 'Doubtful'. A sustained partial but well-marked inhibition of hæmolysis in all tubes is more important than a \pm in one tube (the 2nd tube with serum 1 in 5) only. History will decide the significance in all \pm cases.

2. *When the serum control is partially hæmolyzed (\pm).*—A + in the 3rd or 4th tube is reported as 'Positive in 1 in 10' or 'Positive in 1 in 20'. For a + in the 2nd tube only the serum must be diluted and tested until the 1st tube is fully hæmolyzed.

3. *When the serum control is not hæmolyzed at all or shows only a trace of hæmolysis (+ or T).*—Record + or T. No report is possible. Dilute the serum for further tests.

Observations on the Technique

The quality of complement fixation.—The reaction though specific is weak. Because of this weakness some workers do not employ a fixed period of incubation after adding the rbc suspension. The incubation is continued, while the tubes are being examined again and again, until the expected reaction is obtained. The inhibition of hæmolysis under such condition is not perfect and the reaction is hardly repeatable.

It may be added that the positive rate increases with the duration of the infection, specially with complications of the subacute and chronic stages. The reaction, therefore, is likely to give aid when such an aid is most needed. Unlike the LCF, however, it is not positive in all cases of gonorrhœa even in chronic stages.

For acute and sub-acute cases there is hardly a need for the reactions.

Special features of the technique.—There are 6 such features: (1) the antigen is easily available, (2) the dose of the antigen is linked to the MHD of the complement, (3) the dose of the complement is restricted as much as possible, (4) complement of a poor quality is not used, (5) cold fixation is also employed, and (6) a perfect inhibition of hæmolysis is insisted upon for a + although T and \pm are considered significant.

Repetition of the Reaction.

For technical reasons.—From what has been said concerning the preference for the qualities of the complement, it follows that a doubtful

Serial number	Laboratory registered number	Serologic reaction before vaccination		Serologic reactions Number of days after vaccination					
				6		17		33	
		W.R.	Kahn	W.R.	Kahn	W.R.	Kahn	W.R.	Kahn
1	20	N	N	N	N	N	N	N	N
2	24	N	N	N	443	N	N	..	..
3	27	N	N	N	N	N	N	..	N
4	34	N	N	N	22-	N	N	..	..
5	43	N	N	N	N	N	N	..	..
6	50	N	N	N	N	N	N	N	N
7	54	N	N	N	N	N	N	N	N
8	58	N	N	N	N	N	11- 21-	N	N

+ = 3 doses fixed and 5 doses not fixed.
 ± = Partial fixation of 3 doses, 5 doses not fixed.
 N = Negative.

TABLE II

Titre of Kahn units and type of reaction on verification tests

Serial number	Laboratory registered number	Titre of Kahn units	Type of reaction after verification test
2	24	4	General biologic.
4	34	4	General biologic.
7	54	4	Luetic.
8	58	2	General biologic (false positive) type.

Discussion

Rein and Elsberg found post-vaccinial serologic reactions for syphilis in 44.9 per cent of their series. They examined seropositive cases every week till they were negative. Tetanus toxoid and T.A.B. inoculations were also given to those cases on the same day in addition to smallpox vaccination. They state in a review of the literature on the subject that Arthur and Hale found positive serologic reactions in 14.8 per cent of 95 soldiers who had received routine army immunization against smallpox, tetanus and yellow fever and Lynch and Favourite found 16 and 11.8 per cent respectively of seropositive cases after smallpox vaccination. Doubtful or positive W.R. and/or Kahn tests were observed in 14.3 per cent of the 42 cases of the writer's series. These cases were examined on the 6th and 17th days only. Rein and Elsberg attributed the low incidence rate of false positive reactions observed by other workers to their testing blood only once and collecting blood too soon after vaccinations. They recorded maximum number of seropositive cases in the 3rd week. 7.1 per cent of the writer's series showed serologic reactions on the 6th day

and 17.4 per cent who were seronegative on the 6th day became seropositive on the 17th day. The percentage of cases with positive serologic reactions in the present series would have been obviously more than 14.3 if they could be tested more frequently. Rein and Elsberg observed that 4 units took 2 or 3 months or longer for seroreversal. In the present series, cases 1 and 4 who showed 4 Kahn units on the 6th day were seronegative on the 17th day, and cases 7 and 8 who had 4 and 2 Kahn units respectively on the 17th day were seronegative on the 33rd day. Case 3 was the only one amongst 8 cases with post-vaccinial serologic reactions who was seropositive on the 33rd day.

Rein and Elsberg did not investigate the serologic reactions in the cases who showed immune reaction after vaccinations. They however mentioned in the review of the literature the work of Favourite and Lubitz who reported absence of serologic reactions in cases that developed immune reaction after vaccination.

No accurate record is available with the writer about the types of reactions after vaccinations in the present series except that 3 out of 42 cases developed vaccinia type of reaction. Only one out of these 3 became seropositive.

Summary and conclusion

Forty-two cases who had W.R. and Kahn tests negative before vaccinations were investigated for false positive post-vaccinial serologic reactions. 14.3 per cent of these cases showed positive or doubtful W.R. and/or Kahn tests. The incidence of post-vaccinial seropositive cases would have been higher than this if they had been tested more frequently.

I take this opportunity to thank the officer commanding the camp and British and Ceylonese non-commissioned officers for their help and co-operation and Brigadier C. A. Slaughter, R.A.M.C., D.D.M.S., Ceylon Army Command.

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A Mirror of Hospital Practice

A CASE OF SYPHILIS OF THE LUNGS

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SYPHILITIC infection of the lungs is rare.

The present case was referred to me by a colleague. One skiagram he brought with him and two more were taken by me.

The patient, N. M. K., was an Afghan by birth and money-lender by profession, aged 40; weight 14½ stones; height 6 ft.; health apparently good.

Complaints :—

1. Persistent cough—whole day and night.
2. Sticky phlegm.
3. Sudden hæmoptysis lasting a few days; recurrence thrice.
4. Loss of appetite—feeling run down with weakness of his both lower limbs.

Past history :—

About 12 years back he had an attack of hæmoptysis.



Fig. 1.—Case of secondary syphilis looks like sycosis barbae.



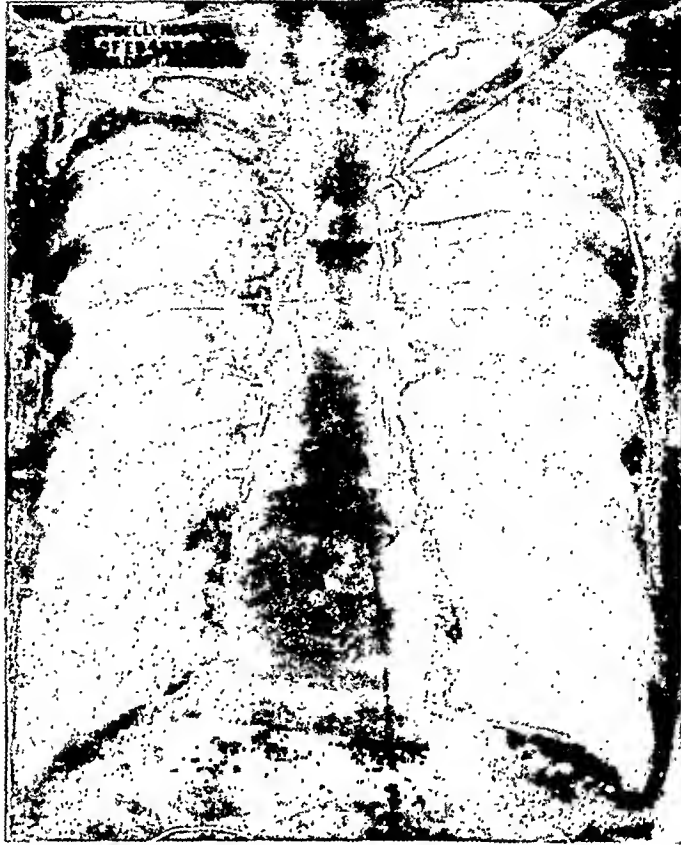
Fig. 2.—Hyperkeratotic type of rash in secondary stage of syphilis giving a leonine face.



Fig. 3.—Case of destruction of nose and lips with closure of mouth and nasal orifices as a result of late syphilis.



Fig. 4.—Destruction of bridge of nose with the overlying skin in a late syphilis.



(Negative damaged during storage)



He admits illicit connections and an ulcer on his genital organ when he was 20 years old—he had no secondary rash.

The patient had no complaints of slow fever, wasting or night sweats; he had no pain in the chest either.

Blood for W.R.—positive.

Sputum after repeated examination—Acid fast bacilli, none found.

Blood counts :—

Hæmoglobin—85 per cent.

Erythrocytes—4,700,000 per c.mm.

Leucocytes—9,600 per c.mm.

Polymorphs—72 per cent.

Lymphocytes—23 per cent.

Monocytes—0 per cent.

Eosinophiles—5 per cent.

Parasites—none found.

Physical signs :—

Râles and rhonchi were present.

X-ray findings.

Part examined—postero-anterior at two metres.

Fluoroscopy—

Apices clear. Illumination normal.

Diaphragm movements poor, the angles are clear.

Skiagram—

Evidence of old infiltration, more or less throughout right lung field, but most marked in the middle and lower zones; on the left side there is radiative fibrosis spreading out from the hilum.

Differential diagnosis :—

1. Tuberculosis of the lungs.

No pain in the chest, no wasting, no fever nor night sweats; sputum was found negative. Apex of the lungs not involved.

2. Cancer of the lungs.

No signs of rapid new growth; no pain nor fever; no deterioration of health.

Provisional diagnosis :—

Interstitial type of syphilitic lungs.

Fibrosis at the root of the lungs; history of sore on the penis due to illicit connection; W.R. positive.

The patient started improving with anti-syphilitic treatment.

He suddenly left India after receiving ten arsenic and eight bismuth injections. No further skiagram was taken.

[This was the position before the false W.R. of the atypical pneumonia was made known. Now to exclude the latter disease a concurrent estimation of the cold agglutinins will be necessary.—Editor, I.M.G.]

Occasional Notes

CAPILLARITY PHENOMENA IN GONOCOCCAL INFECTION IN THE MALE URETHRA

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Just as a matter of curiosity, without attaching any importance to the diagnostic or curative value, I was interested in knowing how the entrance of the gonococci is effected from the female genital organ into the male genital organ during sexual intercourse which is indeed the most common source of infections.

Anatomically the male urethra is a potential cavity, the walls of which are normally kept in apposition except during micturition or emission of semen. During coitus, the penis, under the influence of erotic impulses, gets erected, swollen and hard which state makes the lumen of the urethra more firmly constricted—the walls of the urinary passage become temporarily more apposed. During this physiological condition of the penis, the actual process of transference of gonococci into the male urethra, and the distance covered by them at one stretch of ascendance, before they lodge themselves in some protected area just to spend their hours of incubation period, as a prelude to further upward invasion have, no doubt, much significance with reference to abortive or curative line of treatment. If the process of infection by the gonococcus, its first range of attack and the time taken for it, are ascertained, the modern conception of anterior urethral wash by antiseptics will be completely overhauled.

The mucous membrane of the anterior urethra consists of columnar epithelium except in the fossa navicularis which consists of squamous and stratified varieties. This again rests on the submucous vascular layer.

It is almost an accepted fact that the cylindrical epithelium has got greater affinity for the gonococci than the squamous or stratified epithelium.

During their entrance into the urethra gonococci have evidently got to pass through fossa navicularis without affecting it till they reach the region covered with cylindrical epithelium where the gonococci find a favourable accommodation for their propagation.

During coitus, is there any action like suction which is responsible for the above access of the gonococci into the urethra? Let us compare urethra with a dropper. Pressure is applied on the top of a dropper, column of air is driven out to create a vacuum which, on release of pressure, draws fluid in.

Does gonococcus enter the male urethra after the manner of sap in plants, oil in wicks, water in sponge or ink into blotting paper also?

During erection the lumen of the urethra is obliterated owing to firm apposition of its walls which get equally swollen due to congestion. The greater the congestion of the vessels the stronger the erection of the male genital organ and the more firm is the apposition of the walls of the urethra. During coitus, when the curve of orgasm is on its ascending order, the passage of the male urethra being thus closed, entrance

of the diplococci into the urethra receives natural obstruction.

When orgasm has reached its highest peak, the semen is squeezed along the urethra by rhythmical contraction from behind forwards and is emitted with some force. With the ejection of semen, spasms of the penis gradually wane, and before there is complete relaxation of the penis the fine opening of the internal urethra becomes more or less akin to that of a narrow capillary tube. Into this capillary tube will rise infecting fluid from the vagina.

Therapeutic Notes

NOTES ON SOME REMEDIES

XIII.—DRUGS IN SYPHILIS

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I. ARSENIC

THE arsenicals are classified into inorganic and organic compounds. The inorganic salts have long had a reputation in the treatment of malaria and syphilis, diseases caused by protozoa, and it was thought that they might be of use in sleeping sickness when it was found to be caused by trypanosomes, another protozoal parasite. The results, however, were disappointing because the arsenic could not be given in sufficient quantity without causing poisonous effect on the host. On the other hand, the organic compounds in which arsenic is combined with carbon appear to have the effect of reducing its toxicity, thus enabling more of the element to be given with correspondingly enhanced therapeutic activity. One of the first of these compounds that were tried was atoxyl, it proved useful in syphilis and trypanosomiasis, but while destroying the parasites it was not devoid of toxic effects. Ehrlich found that the pentavalent compounds like atoxyl are really inactive in themselves and only acquired activity when they are changed in the body to the trivalent arsenic and this led him to seek for organic compounds in which arsenic is trivalent. Of these salvarsan was introduced in 1910 and neosalvarsan a little later for the treatment of syphilis. Since then some powerful pentavalent compounds have also been prepared.

Drugs in common use

1. Trivalents

1. '606', salvarsan, arsphenamine. Owing to many disadvantages it is not used except in

the form stabilarsan which is a combination of arsphenamine and glucose and issued in ampoules in the form of a sterile solution. It should be diluted with 5 to 10 c.c. of sterile distilled water and injected intravenously.

2. '914', neosalvarsan, neoarsphenamine. It is manufactured under various names, e.g. novarsenobillon, neokharsivan. Although slightly less efficient than the original salvarsan, this is the drug most frequently used at the present time owing to reduced toxicity and ease of administration. The dose is 0.15 to 0.75 gm. per week. It is given intravenously dissolved in 10 c.c. of sterile distilled water, but as it is rapidly oxidized on exposure to the air, care must be taken to avoid undue aeration while preparing the solution.

3. Mapharside, mapharsen, neohalarsine. It was first synthesized by Ehrlich but was rejected by him owing to its supposed toxicity. Later experiments showed it much less toxic than neoarsphenamine, and owing to this reason it is now being used for intensive treatment of early syphilis, but it can also be employed in routine treatment. The dose is 0.02 to 0.06 gm. twice weekly. Its solution which is more stable is injected intravenously.

4. Sulpharsenamine, sulfarsenol, sulphostab. It is given intramuscularly or deep subcutaneously and is best reserved for cases in which intravenous injections are not possible. The dose is 0.12 to 0.6 gm. which is dissolved in 1 to 2 c.c. of water.

2. Pentavalents

1. The most important preparation is tryparsamide. It is of little value in acute syphilis and its chief rôle is played when the central nervous system is affected as in neurosyphilis and trypanosomiasis. Its molecular structure enables it to penetrate that system easily and act on the parasites. The dose is 1 to 3 gm. dissolved in 10 c.c. sterile water and the solution is injected once weekly intravenously.

Boiling of the solution should be avoided as it may produce toxic compounds. As the drug is liable to cause optic atrophy a careful watch must be kept on the eyes.

2. Acetarsol, stovarsol, or spirocide. It is given as tablets by the oral route but has a low therapeutic value in syphilis. The dose varies from 0.06 to 0.5 gm. daily and its chief sphere of usefulness is in congenital syphilis where for any reason more intensive treatment cannot be given.

3. Acetylarsan. It is a derivative of acetarsol and is given intramuscularly or deep subcutaneously. It is available in ampoules and the dose is 1 to 3 c.c. twice weekly. Its curative power is also low.

Mode of action

After intravenous injection, neoarsphenamine leaves the blood stream rapidly and is stored mainly in the liver; 60 per cent of the drug is excreted within seven days and most of the remainder in another week. More arsenic is excreted in the faeces than in the urine, the bile being the main channel of excretion. The pentavalent compounds are eliminated more rapidly than the trivalent. Arsenicals act in the body by breaking down to the arsenoxide form and liberating ionic arsenic. Interaction takes place between it and the tissues with the production of a substance which has the power of destroying the parasites. The curative action does not depend upon the amount of arsenic present in the compound but upon the amount which is therapeutically usable and this again is dependent on the molecular structure of the compound.

Toxic effects

The following are the more important, though uncommon, reactions after neoarsphenamine :

1. Nitritoid crisis. So called because it resembles the effect of taking nitrites. Following first or second injection a sudden vaso-motor reaction occurs, *viz* flushing of the face and neck, dyspnoea, dilatation of the pupils and tingling of hands and feet, sometimes with loss of consciousness. Later oedema of the face especially of the lips and eyelids may supervene. These appear during or immediately after the injection. The remedy is to stop the injection and give hypodermic injection of 0.5 to 1 c.c. of 1 : 1,000 solution of adrenaline. In subsequent injections adrenaline is similarly given half an hour before the arsenical is administered.

2. Herxheimer reaction ('Therapeutic shock'). This consists in lighting up of the syphilitic lesions from a few hours to a day after the first injection. The reaction disappears slowly and is of no importance in primary syphilis, but in late syphilis in which important viscera may be affected, grave symptoms may accompany such a reaction.

3. Jaundice. Usually it appears after 8 to 12 injections. It is now considered that jaundice occurring during the treatment of syphilis is frequently due to the contamination of syringe by the blood of a syphilitic who is carrying the virus of infective hepatitis and can be prevented by careful attention to injection technique and sterilization of syringes. When it occurs, the treatment with arsenic and bismuth must be discontinued for at least three months.

4. Dermatitis. Excepting transient cutaneous reactions in early stage acute exfoliative dermatitis is usually a late manifestation and may turn out to be a serious complication.

The new drug B.A.L. (British anti-lewisite), primarily developed during the war against the possible use of arsenical gas, has been found to be of value in this condition. It is injected intramuscularly in oily solution, the dose being 3 mg. per kilogram of body weight. It is given every four hours on the first two days, four times on the third day and twice a day for the next ten days. In mild cases smaller doses are sufficient. Side effects of the drug may occur, *e.g.* nausea, vomiting, burning of the lips and mouth, constriction of the throat and chest, for which barbiturates are used. After severe dermatitis patients should not be given arsenic again.

5. Encephalopathy. This is a very rare, but most serious complication. It supervenes within 24 to 36 hours of the injection and is more often seen in intensive arsenotherapy. The symptoms are severe headache, disorientation, mental confusion, convulsion and coma often ending in death. The treatment consists in (1) removal of spinal fluid if under pressure; (2) intravenous glucose and saline; (3) B.A.L. injections and (4) oxygen inhalation.

6. Purpura and aplastic anaemia—Rare.

Of the pentavalent compounds, acetarsol sometimes causes dermatitis. Tryparsamide is prone to exert toxic effects on the optic nerve, warning symptoms being dim and misty vision and contraction of the visual fields. Before each injection the physician should inquire as to the former and make a rough test of the visual field.

II. MERCURY

For centuries mercury was regarded as the only remedial agent for syphilis until superseded first by arsenic and then by bismuth. It has direct selective action on the spirochaetes though the action is slow. But its curative dose is so close to the poisonous that treatment was always a difficult matter and the results were sometimes so appalling that even the public got to know of them and dreaded the medicine than the disease itself. It is still occasionally used (1) in late syphilis, (2) in cardiac and neurosyphilis, (3) in congenital syphilis and (4) when the patient's occupation prevents from taking the regular treatment. By mouth the patient takes Liq.

hydrarg. perchlor., $\frac{1}{2}$ to 1 dr., or iodide of mercury, gr. 1/10, thrice daily for a period of 2 to 3 weeks in each month and this course may be repeated for several months. But the oral route though popular is inefficient and very prone to cause stomatitis and salivation. Inunction is better owing to more regular absorption and less disturbance of digestion but has the disadvantage of being inconvenient and uncleanly. A dram of mercurial ointment or the oleate is rubbed in daily (one day off in a week) for 30 minutes and continued for two to three weeks. Six such courses may be given in the first year and later at less frequent intervals. Mercury by injection is now little used.

Early signs of mercurial poisoning are salivation and gingivitis, followed by colic and diarrhoea. Later the patient becomes anæmic, emaciated and weak.

III. BISMUTH

In 1916 Saunton and Robert found that the sodium-potassium-bismuth tartarate was very effective in treating the spirochaetosis of fowls, and they suggested that the agent might have some value in syphilis. After various trials bismuth was recognized as a drug of considerable value and introduced in the treatment of syphilis in 1922 as an adjunct to arsenical therapy, in which capacity it has now almost replaced mercury, as being less toxic and more effective. As in the case of arsenicals, bismuth has no direct action, but exerts a lethal effect on the parasite only after coming in contact with the body tissues.

The drug is given intramuscularly in the buttock, care being taken not to inject into a blood vessel or pulmonary embolus may occur. Bismuth sub-salicylate in *oily suspension* is the preparation commonly used, the weekly dose being 0.2 gm. given in 1 or 2 c.c. of the suspension. The *oil-soluble* preparations of bismuth, e.g. bismuth ethyl camphorate, are useful when rapid action is desired; as these are absorbed and excreted more rapidly, injections must be given twice a week. Proprietary preparations of these salts are available in the market.

The toxic effects of bismuth are somewhat like those of mercury. In the early stage a blue line forms along the edge of the gums which become spongy and tender. In both mercury and bismuth treatment the mouth should receive thorough care.

Attempts have been made to produce a stable chemical union of arsenic and bismuth which would combine the anti-syphilitic properties of both. One such is bismarsen given twice weekly by intramuscular route in the dosage of 0.2 gm., dissolved in 1 c.c. of water. Four or five courses each of 8 injections are given at monthly intervals. Its use has not become very popular. The action is slow, but it appears to be well tolerated when it is not safe to give more active

preparations as in certain states of cardiovascular lesions.

IV. IODIDES

Iodides are used extensively in tertiary syphilis, their action is exerted not on the parasite but on the gummatous fibrous tissue which is the result of the infection. They help in the resolution of such tissue. Sodium and potassium iodides are most frequently prescribed in 30 to 60 gr. daily or even more according to tolerance, such large dosage being necessitated owing to their rapid elimination by the kidney. They are given for 3 or 4 weeks at a time followed by a rest of 2 or 3 weeks. Only after preliminary iodide therapy more potent drugs should be used in late syphilis.

V. PENICILLIN

One of the most surprising and least expected developments in penicillin therapy is the demonstration of its value in human syphilis. It is very active against the parasites in extremely high dilutions, but precisely what the minimum effective level is and how long it must be continued have not yet been satisfactorily determined. It is very suitable for early syphilis and for cases in which toxic effects prevent continuance of arsenic or bismuth. The immediate effects are very favourable—the surface organisms disappear in 12 to 24 hours, the lesions heal rapidly and the positive serological reactions become negative in 3 to 4 months. But as relapse occurs in a good proportion of cases the present tendency is to give, in addition, one course of arsenic and bismuth therapy.

Penicillin is probably the drug of choice for syphilis in pregnancy. In congenital syphilis the early results have been most encouraging. Late cutaneous and osseous symptoms respond promptly but no adequate reports are available on its action in latent syphilis. Recent reports on its use in neurosyphilis are more favourable than previous ones.

It is now recognized that there exists at least four main types of penicillin which, though affecting the same range of bacteria, differ quantitatively in their antibacterial power. For instance, penicillin II (or G in the U.S.A.) is much more efficacious than penicillin IV (K) in syphilis. Commercial penicillin is an unknown mixture of penicillins and in using it the physician has no assurance that the mixture will contain a preponderance of the type of penicillin which is most effective against the infection from which his patient is suffering. Until this and other matters such as their absorption and excretion are more clearly understood all treatment schedules must be regarded as in the experimental stage. In any case some years must elapse before its final value can be assessed.

Details of dosage will be given later.

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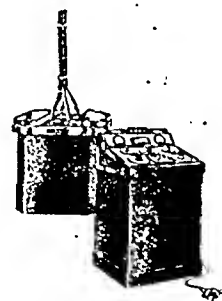
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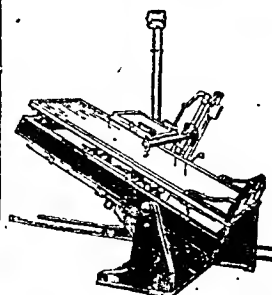
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Indian Medical Gazette

OCTOBER

CONCERNING VENEREAL DISEASES

THE knowledge of venereal disease in India is mostly borrowed. While advances have been made in tropical medicine the original work on venereal diseases has been remarkably scanty, with the result that conceptions that are not quite up to date and, in addition, are not applicable to India are still entertained. Such are the supposed high incidence of syphilis in India and the usual dread of gonorrhœa. Then there are the ignorance of other venereal diseases and the inclusion of non-venereal conditions among the venereal diseases.

Syphilis

Prevalence.—The incidence of syphilis in India is not high at all in spite of published statements to the contrary.

The root cause of the misconception appears to have been the WR positive rate of unselected population. The rate has been found to be as high as 20 to 22 per cent (Iyengar, 1919; Lloyd, Napier and Mitra, 1930). This was due partly to the technique not adapted to the Indian conditions, partly to a lack of a follow-up of the cases and partly, of course, to an implicit faith in the interpretation of the WR given by the European workers of the early days of the WR, based on their experience in Europe. When the defects are eliminated the rate falls to 5 per cent in towns (Grevall and Sen, 1942). In the countryside which is real India it must be much lower. Even in the U.S.A. where 'ten million Americans have it' (Becker, 1937) the disease flourishes mostly in towns and specially in 'boom towns' (Becker and Obermayer, 1947).

That diseases other than syphilis are responsible for a positive WR ('false positive' WR) has now been fully recognized. Long lists of such diseases observed in America have appeared in this journal together with a short list of diseases of special importance in India. They appear again with the latest additions elsewhere in this issue (p. 605).

Comparative benignness.—Not only is the disease not as common as it has been thought to be but quite tame also comparatively. Parasyphilis is a rarity. Even cardiovascular syphilis does not appear to kill with the same ruthlessness as in the West. Syphilis as a cause of abortion has been accepted in India by homology with Europe. It does not approach malaria in its effects.

If syphilis were malignant, as it is in Europe, even from small foci in towns, it would have spread to the masses and aided by their poverty and inability to procure adequate treatment could

have wiped them out within a century or so of Vasco da Gama's arrival in India in 1498. It is believed that he brought it to Asia from Europe (Kampmeier, 1946).

The disease does not appear to thrive in India (Grevall, 1944). Similar observations have been made about East Africa (Ogilvie, 1945).

Apart from the lack of malignancy of syphilis or its inability to thrive on Indian soil, the social system of India is against the spread of the disease: nearly everybody of marriageable age is married and the main problem before most Indians is food, not sex.

Treatment.—Short treatment of syphilis with arsenic, several injections a day and massive dose for a few days, is definitely a risky procedure.

Arsenic treatment after arsenical dermatitis has developed and been cured is not believed to be risky by all syphilologists (Lomholt, 1945). Arsenic preparations can be tried again in small doses.

BAL is a definite advance in treating arsenic and other metal dermatites.

Penicillin in syphilis is the greatest advance so far made in the treatment of the disease. Combination of bismuth, malaria and penicillin is likely to be the ultimate treatment, capable of speedy completion, free from risks and applicable to all stages.

A spontaneous cure has been recorded (Kampmeier, *loc. cit.*).

It is being recognized in the West that an elderly patient with nothing more than a positive Wassermann reaction of the blood to show for a lapse in the remote past is to be congratulated, not treated. In India the occasions for such congratulations are multiplied manifold. Overtreatment rather than undertreatment is the danger in most cases undergoing the Western system of anti-syphilis treatment.

Ninth day erythema.—A morbilliform or scarlatiniform erythema occurring 8 to 10 days after the first injection of an organic arsenical preparation has attracted the attention of syphilologists and dermatologists. It is also known as Milian's ninth day erythema. Some do not consider it as the forerunner of the dreaded exfoliative dermatitis of the arsenical treatment (McLachlan, 1947; Andrews, 1946; Sequeira *et al.*, 1947; Roxburgh, 1947). Others recommend caution (Kampmeier, *loc. cit.*; Wiener, 1947) and yet others can see the connection between the two conditions (Lomholt, *loc. cit.*; Becker and Obermayer, *loc. cit.*).

Arsenical dermatitis appears to be caused by trivalent compounds alone. Arsenoxide and tryarsamide may still be used, especially the latter in cases of syphilis of the central nervous system.

Unusual forms of syphilis. 1. *Syphilis d'emblée or cryptogenic syphilis.*—It undoubtedly occurs and the patient who denies history of a chancre is not necessarily prevaricating (Sequeira

et al., *loc. cit.*; Andrews, *loc. cit.*; Kampmeier, *loc. cit.*; Lomholt, *loc. cit.*). Either the primary sore was so inconspicuous that it was missed or the infection occurred into deeper layers of the skin through pricks such as a surgeon inflicts on himself accidentally during an operation. A recipient of syphilitic blood also develops rash without a primary sore.

2. *Extragenital syphilis*.—Such a condition occurring endemically in Asia Minor was reported towards the end of the last century (E. von Düring, quoted by Sequeira *et al.*, *loc. cit.*). It was conveyed by extragenital infection. Genital sores were exceptional. Secondary manifestations occurred in children and tertiary in adults. The majority of the adult patients suffered from severe destruction of bones recalling the grave lues of the sixteenth century in Europe. Bejel reported recently from the Upper Euphrates Valley, and *Firjal* and *Loath* reported from Iraq and Palestine appear to be the same condition. It is agreed that these diseases are not yaws, but the position is certainly intriguing. It is not unlikely that originally the four causal organisms of syphilis, yaws, pinta and bejel developed from a common source, 'but it seems more probable that Bejel was historically the earliest of the treponematoses, from which these other diseases evolved' (Senekjic, 1946).

Pinta is a contagious disease characterized by papulosquamous eruptions and pigmentary disturbances. It is caused by *Treponema carateum* and is confined to the tropical countries of the Western hemisphere.

[Incidentally, the treponema appears to have five other names: (1) *T. herringtoni*, (2) *T. pector*, (3) *T. americana*, (4) *T. pental*, and (5) *T. dichromoderma*. It is indistinguishable from *T. pallidum* under the microscope—Wiener, *loc. cit.*]

The extragenital lesion of the ordinary variety of syphilis is estimated at 5 to 10 per cent. The usual sites are the lips, tongue, tonsils, female breast, index finger and anus. When there is a rash accompanied not by a sore on the penis but by enlargement of the outermost inguinal glands on one side only, the anus should be suspected strongly and examined carefully.

Details of sites and frequencies, according to several authors, are given elsewhere in this issue (p. 636).

3. *Syphilis ignorée*.—An insignificant, neglected, remote and forgotten episode may produce a lesion of tertiary syphilis. Such are not rare in women (Lomholt, *loc. cit.*).

4. *Chancre redux*.—This lesion has been believed to be a guinea occurring on the site of a chancre (Roxburgh, *loc. cit.*). Recent workers have called such a lesion pseudochancre redux.

The original name is now applied to a recurrent chancre which is simply a chancre which has become active again, due to inadequacy of treatment, etc. The spirochaetes start multiplying again and the lymphatic glands of the region

enlarge once more. This can occur up to 2 years after the infection.

Chancre redux must be taken into consideration in deciding whether fresh infection has occurred in a treated case. The chancre of the fresh infection must not be (i) on the old site or (ii) in an area drained by the previously enlarged lymph glands.

5. *Syphilophobia*.—This mental state is a real danger and has been dealt with elsewhere in this issue (Blood Test Obsession, p. 607).

The spirochaete.—This time-honoured term now definitely describes four groups of organisms spiral in shape: (1) spirochaeta containing an axial fibre round which the body of the organism is coiled in a spiral manner, (2) cristospira possessing a membranous crista in addition to the coils, (3) treponema possessing only a spiral body but neither an axial fibre nor a crista, and (4) leptospira possessing a large number of closely wound turns in its spiral body. The causal organism of syphilis is *Treponema pallidum*. The old name, *Spirochaeta pallida*, although permissible, may not be used.

For microscopy a direct film from a lesion from an area where all sorts of spirochaetes may be found is not so satisfactory as the one made from material aspirated from a lymph gland of the area.

Electron microscope has added to our knowledge of the structure of the spirochaete. It has flagellae at the ends and shows evidence of dividing transversally in multiplying. The coils disappear during the preparation of the specimen for the microscope in drying.

Therapeutic paradox.—This term is applied to deformity consequent on excessive scarring which is in its turn consequent on excessive fibrosis occurring in the healing of a lesion of late syphilis under treatment. Herxheimer reaction increases the inflammation and tissue destruction which heal by more fibrosis than what would have been necessary otherwise (Kampmeier, *loc. cit.*). All cases with suspected inflammatory foci in vital organs should, therefore, be treated with bismuth and iodides before trying arsenic. The former cause less reaction than the latter. This precaution may be applied also to penicillin which is capable of causing a reaction. Cases of cardiovascular, visceral and neuro-syphilis need special consideration.

Gonorrhœa

Gonorrhœa also is a comparatively mild disease. Its usual complications were not very frequent in India even before the introduction of the sulphonamides and penicillin. One knew of husbands who got over the disease and raised large families. A day set aside for weekly passage of bougies was never a feature of big hospitals in India. Arthritis was seen but was not common enough to provide positive sera for use as controls in complement-fixation tests in a

big city like Calcutta. The use of streptomycin may, in future, leave no patient uncured as cases not responding to penicillin (after the failure of sulphonamides) are stated to respond to it. Further, streptomycin, unlike penicillin, is not supposed to mask syphilis (*vide infra*).

Soft sore

Very little original work has been done on this disease in India. Mistaken diagnosis of syphilis, in addition to that of soft sore, because of a hubonulus appearing later is more than likely. The latter complication is not well known. It results from a back flow from a bubo and produces a second ulcer on the penis several weeks after the first. Hence the diagnosis of syphilis on a perfunctory examination.

Further, little work in India is available on the recent finding that a female giving the disease may not show any lesions: the organism lives as a saprophyte in her.

Is a similar state of things possible in syphilis? Even when due regard is paid to the anatomical difficulties, the primary sore is not so easy to find in the female as in the male. Moreover, the female on the whole suffers less from syphilis, being protected, probably, by her hormone and monthly alterations in her biochemistry. Every pregnancy helps her in her cure when she is infected. In experimental syphilis male rabbits are easier to infect than female ones.

Very little testing has been done with the killed Ducrey's bacillus (Reinstierna's intradermal test) although a preparation, Dmeicos, has been available for some time.

There is an immunological reciprocity between this disease and the next disease (lymphogranuloma inguinale). Cases of the latter react with the specific antigen of the former and those of the former react with the specific antigen of the latter.

Ducrey's bacillus is sensitive to streptomycin. This should facilitate the treatment of cases not tolerating or resisting sulphonamide. Unlike penicillin, streptomycin does not mask syphilis which might have been acquired at the same time (McElligott, 1947) as has been stated above. This, however, has been doubted in view of experimental work on animals.

Lymphogranuloma inguinale

The disease is diagnosed very rarely although it occurs in India undoubtedly. Further, the main complication of the disease is its nomenclature. Recognized synonyms are: (i) climatic bubo, (ii) lymphopathia venereum, (iii) poradenitis (Wilson and Miles, 1946), and (iv) tropical bubo (Lomholt, *loc. cit.*). It is also called, loosely, lymphogranuloma venereum (Tobias, 1945) and, incorrectly, even granuloma venereum. Lymphogranuloma inguinale is to be preferred to the rest. The infecting agent is a virus which can be grown on egg membrane. The latest

Frei's antigen is artificially grown, not a dilution of pus from buboes.

Systemic infection with the virus.—Such an infection has been considered as a possible cause of arterial diseases like arteriosclerosis, thromboangiitis, temporal arteritis, giant-cell arteritis and periarteritis nodosa. Mass skin testing with the Frei antigen indicates that the infection is widespread and may occur without apparent lymphadenopathy. It should be thought of in various vascular disorders particularly in young adults (Davies, 1947). Lest these suggestions be taken more seriously than they really deserve it should be stated that recently periarteritis nodosa has been linked to severe allergic disturbances such as occur in asthma, serum sickness, drug allergy, and rheumatic fever (Alexander, 1947).

Congenital lymphogranulomatosis.—Human cases have been found positive by the Frei test and this possibility entertained. Experimentally the disease has been known to pass the placenta in the mouse (Davies, *loc. cit.*).

Serological diagnosis. (1) *Reciprocity with soft sore in skin tests.*—This has already been mentioned.

(2) *Persistence of skin reaction.*—This reaction lasts much longer than the local lesion. This fact is in favour of a systemic infection like syphilis reaction of which also lasts longer than the lesions.

(3) *Complement fixation with Frei antigen.*—This is not satisfactory. The following interfere: (i) psittacosis, (ii) syphilis, (iii) meningopneumonitis, (iv) trachoma, (v) virus pneumonia, and (vi) inclusion hemorrhage (Wadsworth, 1947).

Granuloma venereum

Its recognized synonyms are: (i) granuloma inguinale (Wilson and Miles, *loc. cit.*), (ii) granuloma venereum inguinale (Lomholt, *loc. cit.*), (iii) granuloma ulcerative, (iv) ulcerative granuloma of the genito-inguinal regions, (v) tropical granuloma, (vi) chronic venereal sores, and (vii) serpiginous ulceration of the groin (Rajan, 1937). Granuloma venereum is to be preferred to the rest. The infecting agent is *Donovania granulomatis*, resembling bacilli of the Friedlander group and needing unique growth requirements (Wilson and Miles, *loc. cit.*).

Non-venereal diseases involving genitals

Such diseases undoubtedly exist and are likely to be mistaken for venereal diseases.

Ulcus vulvae acutum and ulcus insons puellarum.—As described in Europe they are probably the same disease and occur in females, mostly children. *Bacillus crassus* has been demonstrated in some cases to be the cause. The lesions appear as small superficial crust-covered ulcers with sharp edges usually on the labia. Occasionally fever and swelling of the inguinal glands are present. Prognosis is good.

Differentiation from venereal disease must be made.

In contrast with this disease, the soft sore affects males, leaving at least some females free.

Reiter's disease (Reiter's syndrome).—A virus disease first described about 30 years ago has attracted attention recently. Indian cases have also been described. Urethritis, pyrexia, cachexia, arthritis, conjunctivitis, iritis and keratoderma are found associated in various combination. The pus from urethra is free from gonococci. The skin lesion, *Keratoderma blennorrhagica*, in this disease and gonorrhœa appears to be one and the same condition and probably always due to the virus which is associated with gonorrhœa at times (McLachlan, *loc. cit.*).

The skin lesion usually confined to soles and palms may occur anywhere as rupia-like crusts.

Behcet's disease (or Behcet's triple syndrome).—This disease has been observed in the U.S.A. Ulceration of the genitals, aphthous lesions of the mouth and uveitis or iridocyclitis occur. Both eyes are eventually involved and lead to blindness. The eye may be attacked later than the genitals and the mouth. Other associated lesions are erythema nodosum, erythema multiform-like condition, acneiform eruptions, papulopustular eruptions, carbuncle-like pyoderma, sub-lingual abscesses, hydrops of knee joint, cerebral symptoms and a marked sensitivity to the various skin tests. Recently a case has been diagnosed in England (Thomas, 1947).

Stevens-Johnson syndrome (Stevens-Johnson disease).—This variety of erythema multiforme exudativum (Andrews, *loc. cit.*) when involving mucous membranes may be mistaken both for syphilis and gonorrhœa. Recently, cases have been described in England with purulent discharge from urethra and conjunctivitis (Nellun, 1947; Murray, 1947). Penicillin has proved useful.

Verruca acuminata.—This condition commonly known as venereal warts and probably caused by a virus is often found associated with gonorrhœa and trichomonas infection. It is known as condyloma acuminatum which of course has nothing to do with the condyloma latum of syphilis. In the female they are usually limited to the vulva but may occur in the vagina or on the cervix. In the male they occur usually on the glans penis, coronal sulcus and inner surface of the prepuce, but occasionally intra-urethrally.

Balano-posthitis.—The condition is an inflammation of the surface of the glans penis (balanitis) and of the inner surface of the prepuce (posthitis). It may occur from many causes and produce several semblances of venereal diseases and neoplasms. It is frequently associated with phimosis.

Trichomonas infection.—It occurs usually in the female and occasionally in the male. Extension upwards is possible. The infection also hides and protracts gonorrhœa. The diagnosis is made by the microscope and the treatment may be long.

Inclusion blennorrhœa.—The condition is also known as inclusion conjunctivitis and swimming pool conjunctivitis (Hyman, 1947). It is caused by a virus similar to the one found in trachoma. The virus probably occurs in the urethra in the male and in the cervix in the female. The conjunctivitis is most marked in the lower lid and is cured by sulpha drugs locally, in ointment, and by the mouth. Diagnosis is made by finding the inclusion bodies and by the clinical course.

Herpes.—This disease must be mentioned as spirochaetes (other than *J. pallidum*) may be found in it, near the genitals.

On the other hand, the primary lesion of lymphogranuloma inguinale may look like herpes.

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Special Article

CHIEF LEGAL ASPECTS OF THE VENEREAL DISEASES

By SARDAR SAHIB R. S. GREWAL, M.B.E., M.A., LL.M. (Delhi), F.R.F.P.S. (Glasgow), L.M.S. (Singapore).
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THE following are the main legal aspects of the venereal diseases in which a medical practitioner may be called upon to express an opinion :

1. Implanting of venereal disease in cases of rape.
2. Divorce or dissolution of marriage.
3. Nullity of marriage.
4. Cruelty.
5. Libel and slander.
6. Rules of evidence and professional secrecy.

Implanting of venereal disease in cases of rape

Every medical practitioner or rather more so medical men in Government service are very frequently called upon during the course of their medico-legal work to examine cases of rape. In these cases generally the victim is produced and in some cases the accused also. In addition to other examination for violence, etc., one of the main points in the examination is to look out for venereal disease. If the accused has been suffering from gonorrhœa or syphilis he is likely to infect the victim more especially if the victim is a young girl, as the mucous membranes in the young children are very susceptible to infection. Therefore a careful search should be made for gonococci in the urethral canal and vagina. Urethra should be massaged if necessary and

history of the burning and pain during micturition enquired into. Slide smears should be taken, stained and examined.

Following rules will help as a guide :—

(a) There will be no organism if the patient is examined during the period of incubation.

(b) If the woman is suffering from profuse discharge at the time of examination it is evident that infection must have taken place some time back.

(c) In case of soft sore there is possibility of infection recently.

I have seen many young children suffering from acute gonorrhœa in my medico-legal work.

The victim is usually brought sometimes after the occurrence of crime owing to delay caused in giving First Information Report and the usual procedure to bring the victim before the court and getting consent for medical examination. Therefore by that time if the case is a genuine one and of recent infection early signs and symptoms of gonorrhœa are likely to be present.

Divorce or dissolution of marriage

The relevant section of the Matrimonial Causes Act 1937 is section 7 (1) (e) which reads : 'That the respondent was at the time of the marriage suffering from a venereal disease in a communicable form'. The venereal disease includes gonorrhœa, syphilis and soft sore but *not* venereal itch.

The provisions in the Parsi Marriage and Divorce Act 1936 are section 32 (c).

'That the defendant has infected the plaintiff with venereal disease'.

Divorce is often sought by the wife on the ground that the husband has contracted virulent venereal disease *long after* the marriage. Long after the marriage is important as it proves adultery or at least goes in favour of adultery which is the main ground of divorce. This does not occur in recent infection because a recent infection might be, that is to say soon after the marriage, an act of misconduct prior to marriage or anti-nuptial irregularities indulged in sexual matters. Recent in these cases would mean within the incubation period of the venereal disease.

Reference :

Gleen v. Gleen (1900), 17 T.L.R. 62
and

Anthony v. Anthony, 35 T.L.R. 559

Nullity of marriage

Venereal disease may be a ground for nullity of marriage for the simple reason that the party suffered from virulent communicable disease and marriage has never been consummated at all.

Cruelty

Legally speaking cruelty includes much more than physical violence such as beating. It includes the communication of venereal disease.

Therefore if it can be judged from the circumstances that the husband intended to communicate venereal disease it will be a very good ground for divorce on the ground of cruelty.

Reference :

Collet v. Collet (1828), 1 Curt EC 678.
and

Brendra v. Hemlata (1921), 48 Cal. 283

Finally it should be remembered that it amounts to cruelty if the husband has connection with his wife against her will, when suffering from venereal disease.

There are many debatable points and lines of argument for which the reader should refer to bigger books and authorities like Lord Riddle, Cruickshank and others.

Libel and slander

A medical man is not exempt from an action of libel. It is a matter of common practice for an employer of Insurance Co. to enquire about the presence or otherwise to the venereal disease or in the case of an employment of a servant. In these cases he is generally well protected by the qualified privilege. A qualified privilege may be defined as one in which the parties have mutual interest. Mutual interest on the part of the medical man is usually his moral or other professional obligation and on the part of the employer or master his personal interest. Therefore if he acts in a *bona fide* manner he is safe but if it can be proved that he gave the opinion out of sheer malice then he may have to pay heavy damages as in the case of

Kiston v. Playfair, 1896, The Times, March 28

[Due to the limit on the size of the journal some contributions received for this number could not be included. They will follow in a subsequent issue.—Editor, I.M.G.]

In cases of slander the English law is that any spoken imputing of a person suffering from contagious disease which includes venereal disease to another is actionable *per se* that is to say at all events it is actionable without proof of damage.

Rules of evidence and professional secrecy

The usual rule regarding the compellability of medical witness to testify facts is that he is not protected. He can be compelled to testify to facts. It was decided in

Garner v. Garner (1920), 36 T.L.R. 196

that the medical witness is compellable to testify to the facts of venereal disease in a patient whom he treated.

Professional secrecy

In U.S.A. to divulge a secret received during the course of professional relationship is an offence. In Australian State of Victoria, professional secrets are protected. In England there is no such protection. In Garner v. Garner (1920), 36 T.L.R. 196, the provisions of the Public Health (Venereal Act) Regulations 1917 S.R.O. were overridden by Macardie, J. and compelled the medical witness to divulge the patient's condition at the time of treatment in venereal case and remarked that in a Court of Justice higher considerations arose than that by which a medical man was bound to his patient with respect to professional secrecy. Section 126 of the Indian Evidence Act gives protection to barristers, vakils, etc., but not to the doctors.

Medical News

MARRIAGE HYGIENE (SECOND SERIES)

(Published quarterly from Whiteaway Building, Hornby Road, Bombay. Editor-in-Chief, A. P. Pillay, O.B.E., M.B., B.S. Subscription Rs. 2-12, single copy Rs. 3-8)

THE first issue of the first series of *Marriage Hygiene* appeared in August 1934 and the last issue in August 1937. The first issue of the second series, dated August 1947, has just been received.

The objects of this journal are : 1. To secure for the subject of sex its proper place in medical and social science by emphasizing its significance and interactions on personal, marital, and social life. Sterility, sex anomaly, sex delinquency, contraception and other allied subjects will not be neglected. 2. To promote the study, clinical as well as research, of sex and sex problems and encourage medical men, psychologists, lawyers,

social workers, and others interested. 3. To educate the public by publishing scientific contributions on the manifold aspects of sex, as it is now recognized that ignorance of biological facts is the prime factor in the alarmingly increasing sex inefficiency, marital maladjustment and family disruption. 4. To encourage the foundation of sex and marriage consultation clinics in various parts of the world and to co-ordinate the interests of those already existing.

The present issue contains original communications on 'Frigidity, misconceptions and facts' by Edmund Bergler, 'The martyrdom of man in sex' by Anthony Ludovici, 'The Hulmer test in sterility' by Max Hulmer, 'Modern insight on incest' by Marc Lanval, and 'Disorders of erection' by J. Lowenstein and sections entitled 'Notes and comments', 'Lives of great men' (series), 'All too human' (series), 'Neurology' and 'Reports, reprints and reviews'.

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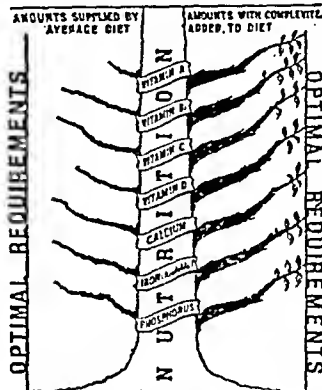
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1. Vogt-Moller, P., Tier. Rund., 1942, 46.

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Fig. 1

everything else had remained at the inner side of the junction of the middle and lower thirds of the leg. On the 30th October he was admitted to hospital. The skin around the ulcer for at least 2" was found to be of poor quality. Radical excision of ulcer and surrounding area of unstable skin was performed. A cross-leg flap from opposite calf was

CASE HISTORY

The patient, aged 34, broke his leg while jumping between ships. A fracture involved the lower end of the left tibia and fibula. He was in plaster for about eight months and in Elastoplast for a further month or so. During these ten months he had numerous sequestra from the fracture site and when

sutured into the defect. The raw donor area was covered with thin razor graft, dressed with tulle gras (Jelonet). Previously applied Gypsona plaster boots were then joined with additional



Fig. 2

Gypsona bandages. After three weeks the plaster was removed and three days later the flap was divided. In two months the flap was

completely healed and the patient discharged. The details and illustrations above are of an actual case. T. J. Smith & Nephew Ltd., of Hull, England, manufacturers of Elastoplast, Jelonet and Gypsona, publish this instance—typical of many in which their products have been used with success.

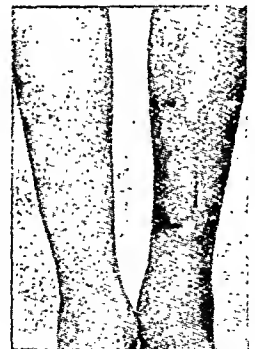


Fig. 3

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Current Topics, Etc.

Penicillin in Treatment of Infantile Congenital Syphilis

(Reprinted from *Medical Newsletter* No. W-449, dated May 1947, prepared by the American Medical Association)

THIS report is based on an analysis of 191 infants under two years of age with manifest congenital syphilis treated by university groups at New Orleans, Philadelphia, Baltimore, and Galveston. The total dosages employed for effective treatment have varied from 20,000 up to 150,000 units per kilogram of body weight among infants for whom adequate observations have been made. It is recommended that dosage schedules in excess of 40,000 units per kilogram be used, and that treatment continue for 60 or more equal intramuscular injections given at three-hour intervals. Schedules comprising 80,000 or more units per kilogram, divided into 120 equal intramuscular injections given every three hours night and day for a period of 15 days, have not yet been evaluated.

Reactions to therapy have appeared unimportant, and we have seen no justification for gradually increasing dosage at the outset of a projected course to avoid these. Only a relatively small number of infants will demonstrate seronegativity during or soon after a single course of penicillin. The number of patients becoming seronegative increases with each month of observation for at least 18 months. Careful periodic examinations are necessary to recognize the small number of serologic and clinical relapses which will require additional therapy. Deaths among infants included in this series do not appear to be related to the use of penicillin or to therapeutic shock.

The authors conclude that although the best method for its use has not been defined, penicillin appears to be the best single agent for the treatment of infantile congenital syphilis. Final evaluation of the efficacy of penicillin in congenital syphilis must await trial of additional schedules of treatment and methods of administering the drug, as well as clarification of the relative spirochæticidal and spirochætostatic action of its constituent fractions.

In a note written after this paper had been completed the authors state that because of the changing character of penicillin mixtures they recommend a total dosage of at least 100,000 units of penicillin per kilogram of body weight, divided into approximately 120 equal intramuscular injections, given at intervals of no longer than three hours 'around the clock' for a period of 12 to 15 days. (Platou, R. V. *et al.* Effect of Penicillin in the Treatment of Infantile Congenital Syphilis. *Am. J. Dis. Child.*, 72, 635, December 1946.)

Studies on Lymphogranuloma Venereum Complement-Fixing Antigens

By CLARA NIGG,
MAURICE R. HILLMAN
and
BETTY M. BOWSER

(Abstracted from *The Journal of Immunology*, Vol. 53, No. 3, p. 259, July 1946)

IN an attempt by one of the authors (Nigg) to find a suitable preservative for lymphogranuloma venereum complement-fixing antigens, phenol was added to a 10 per cent suspension of infected yolk sacs to give a final concentration of 0.25 per cent. The phenolized sample which had been stored at 37°C., instead of showing deterioration as was expected, was four times as active as the control and the two samples kept at lower temperature were twice as active.

A study of the conditions which determine phenolic enhancement is the subject of this paper.

Materials and methods

Yolk sac suspension.—Six-day-old chick embryos were inoculated into the yolk sac with a suspension of lymphogranuloma venereum (LV) virus (Johns Hopkins strain) so standardized that the majority of the embryos died between the sixth and eighth days after inoculation. The yolk sacs were harvested soon after death of the embryos and stored in Lusteroid tubes in a dry ice cabinet. Twenty per cent saline suspensions were prepared from heavily infected frozen membranes by homogenizing in a Waring blender for three to five minutes. To phenolize the suspensions, saline and phenol were subsequently added to make 10 per cent suspensions containing 0.5 per cent phenol. Urea in a final concentration of 2 per cent was usually added to the unphenolized 20 per cent suspensions to inactivate the virus. Suspensions similarly prepared from normal yolk sacs of approximately the same age served as control material in all experiments. The pH of the suspensions usually varied from 6.2 to 6.8. All antigens were bacteriologically sterile.

Antigen standard.—A unit of the antigen was arbitrarily defined as 0.2 ml. of the highest dilution which gave complete fixation with 0.2 ml. of a 1 to 5 dilution of the weakest of these LV serums. This antigen gave no reaction in any dilution tested with normal serums.

Serum standard.—The pooled serums from several clinical cases of LV with positive skin reactions and negative Wassermann reactions were used as stock serum standard. A unit of this serum was defined as 0.2 ml. of the highest dilution which gave complete fixation with 0.2 ml. (1 unit) of the antigen standard. In no case did the serums used in these studies react with antigens prepared from normal yolk sacs.

Titration of antigens.—To 0.2 ml. of 2-fold serial dilutions of the various antigens were

added 0.2 ml. (2 units) of frozen guinea-pig complement and 0.2 ml. (2 units) of standard LV serum in the order stated. Following incubation at 37°C. in the water bath for 1½ hours, one unit (0.4 ml.) of sensitized sheep red blood cell suspension was added and the tests incubated further for ½ hour. Appropriate controls for each reagent were included. Antigen titre was defined as 0.2 ml. of the highest dilution showing complete fixation.

Experimental

There was little or no enhancement when the phenol was added immediately after the suspensions were prepared and subsequently incubated at 4°C. If, however, the phenol was added immediately and the phenolized suspensions subsequently incubated at 37°C. three of five antigens showed 10 to 16-fold enhancement. The antigens that showed marked enhancement did so after 22 to 60 days' incubation at the same temperature.

All of five preparations which had autolysed for 33 to 45 days at 4°C. before addition of phenol and were subsequently incubated at 37°C. for approximately one month showed at least 4-fold enhancement.

The last two phenolized antigens prepared in this study were both phenolized immediately after the suspensions were made and placed at once at 37°C. Both showed 16-fold enhancement. One of these had been kept at 37°C. after phenolization for 22 days (and subsequently stored in the refrigerator) and the other for 34 days. The authors are of the opinion that such a procedure will induce 8 to 16-fold enhancement quite regularly.

As a rule, phenolic enhancement developed slowly and several weeks were often required to effect maximal enhancement regardless of whether the suspensions had been permitted to autolyse before addition of phenol. The titre of the urea-treated control for suspension (which had been stored in the refrigerator) was 1 to 200 whereas the phenolized fraction finally reached a titre of 1-3,200 after four weeks in the refrigerator. The titre of the phenolized suspension likewise increased from 1-200 to 1-3,200 after three weeks at 37°C. and subsequently storage in the refrigerator.

Antigens treated with phenol in concentrations as high as 5.0 per cent showed essentially the same enhancement as those treated with 0.5 per cent phenol.

These LV complement-fixing antigens prepared from infected yolk sacs were remarkably heat stable.

Boiling and phenolization could induce approximately the same degree of enhancement.

The presence of phenol, whether it had induced enhancement or not, did not interfere with the development of enhancement by boiling. On the other hand, if the full potential enhancement had been induced by phenol, sub-

sequent boiling sometimes caused a drop in titre.

Autoclaving phenolized suspensions also induced enhancement.

A series of experiments to determine the possible rôle of pH showed that there was little or no effect on phenolic enhancement at pH 6.0 to 7.5 under any of the conditions investigated. Suspensions buffered with Na-K phosphate often became anticomplementary especially in the higher pH range. The presence of urea seemed to have no effect on enhancement by phenol.

Discussion

The phenolic enhancement described in this report seemed to involve a complex degradation or disassociative process in which autolytic changes, time, temperature and the concentration of phenol played a part. The autolytic changes were a contributing factor. Apparently the requisite autolytic changes in the presence of phenol took place at 37°C. but not at 4°C. Why some preparations failed to develop phenolic enhancement under conditions which quite regularly induced enhancement in others which were similarly treated is inexplicable in the present state of our knowledge concerning the fundamental mechanism involved. That the potentiality for enhanced activity was not lacking in such preparations was shown by the fact that boiling them resulted in as much as 16-fold enhancement.

The difficulty of elucidating the mechanism is increased by the fact that the suspensions consisted largely of non-virus constituents which varied qualitatively and quantitatively depending on such factors as age of embryo at time of harvest, interval between death of embryo and harvest, etc.

The remarkable stability of LV yolk sac antigens at boiling and even higher temperatures strongly suggests that the active fraction possesses carbohydrate properties.

The possibility that the LV complement-fixing antigen may derive from a protein-polysaccharide-lipid complex is suggested both by its stability and its solubility in ether. Phenol may produce disassociative changes resulting in a greater degree of dispersion, which might explain the increased complement-fixing reactivity. Another possibility which should be considered in attempting to explain the mechanism of enhancement is the inactivation of some inhibiting substance either by phenol or by boiling.

These phenolized or boiled antigens are similar to all other LV complement-fixing antigens which have been described in that they lack specificity since they also react with the serums from cases of psittacosis and ornithosis.

Boiled phenolized antigens possess the following advantages:—

1. Activity is greatly enhanced.
2. Phenol serves as preservative.
3. Phenolized antigens are rarely anticomplementary.

4. They exhibit remarkable stability and remain so for over two years.

A. B. R. C.

Studies on Lymphogranuloma Venereum Complement-Fixing Antigens

By BETTY M. BOWSER

and

CLARA NIGG

(Abstracted from *The Journal of Immunology*, Vol. 53, No. 3, p. 269, July 1946)

A HIGH incidence of positive complement-fixation reactions with syphilitic sera, when tested with lymphogranuloma venereum (LV) elementary body suspensions as antigen, has been reported. To determine whether boiled phenolized antigens prepared from yolk sacs infected with lymphogranuloma venereum virus would show a similar high incidence of positive reactions with syphilitic serums three types of syphilitic serums were studied: (a) unselected positive Wassermann serum, (b) serums from cases of primary and 'early' syphilis, and (c) serums from cases of secondary syphilis.

Of 68 unselected positive Wassermann serums, 35.3 per cent reacted specifically with LV boiled phenolized antigen while 10.3 per cent gave non-specific reactions in that there was fixation with both the specific and control antigens.

Of special interest were the observations that of 27 serums from primary and 'early' syphilis, 77.7 per cent reacted with both the specific and control antigens and of 12 serums from secondary syphilis all but one (91.7 per cent) likewise reacted with both antigens.

It was thus obvious that a serological diagnosis for LV could not be made with most sera from the earlier stages of syphilitic infection when either boiled phenolized antigen or the elementary body antigen was used. Attention was therefore directed toward fractionation of the antigen in the hope of eliminating the non-specific type of reaction described above.

It was previously reported that the relatively clear supernate from phenolized boiled antigens prepared from yolk sacs infected with lymphogranuloma venereum virus gave satisfactory complement-fixation reactions with LV serums. In as much as the coagulable protein was largely removed in the preparation of the boiled supernate-antigen, a very considerable purification was thereby effected. It seemed possible that antigens purified in this way might be devoid of the factors responsible for the non-specific fixation so frequently encountered with serums from early syphilis. Boiled supernate-antigens were therefore compared with whole boiled phenolized antigen in complement-fixation tests with such syphilitic serums as gave the non-specific reactions described above.

Fifteen selected syphilitic serums, all of which gave non-specific reactions with the control boiled phenolized antigen, were tested with

various boiled supernate-antigens. The non-specific reactions encountered with control antigen were entirely eliminated in every case by using these boiled supernate-antigens and their corresponding controls. An unequivocal serological diagnosis of LV would thus seem to be indicated in these 15 patients whose histories showed syphilitic infection.

Phenolized boiled supernate-antigens prepared from yolk sacs infected with lymphogranuloma venereum also gave positive complement-fixation reactions with the serums of patients recovered from psittacosis and ornithosis. These cross reactions emphasize the close antigenic relationship within the psittacosis-lymphogranuloma venereum group of viruses.

A. B. R. C.

Rapid Treatment of Early Syphilis with Penicillin in Beeswax and Oil

By EVAN W. THOMAS, M.D.

SIMEON LANDY, M.D.

and

CORINNE COOPER, M.D.

(Abstracted from the *Journal of Venereal Disease Information*, Vol. 28, February 1947, p. 19)

THE treatment of early infectious syphilis with calcium penicillin in beeswax and peanut oil was started at the Rapid Treatment Centre in Bellevue Hospital in August 1945.

From 1st August, 1945 to 25th July, 1946 a total of 802 patients with early infectious syphilis received 4,800,000 units of penicillin in beeswax and peanut oil in a period of 8 days. One group received two injections of 300,000 units daily, morning and evening, for 8 days. The second group received one injection of 600,000 units daily for 8 days. After some time all patients were given a single daily dose of 600,000 units for eight injections.

Patients with primary and/or secondary syphilis only were treated with this preparation of penicillin. All had darkfield positive lesions except for a few who had serologic relapses following previous antisymphilitic treatment for early infectious syphilis. Of the 802 patients treated, 100 had had previous therapy for early syphilis following which they had been reinjected or relapsed. Of the 100 reinfections or relapses, 28 were retreated because of reinfections or relapses following previous treatment at the centre with penicillin in beeswax and peanut oil.

Reactions to treatment

All injections were given intramuscularly, care having been taken to aspirate after the needle had been plunged into the muscle to avoid injection into the blood stream. There was no instance of embolus following any of the injections.

Of the 802 patients treated, 41 (5.1 per cent) had pain and induration at the site of injections only, 77 (9.6 per cent) had low-grade fever usually developing on the fifth to seventh day of treatment associated with pain and induration at the site of injections, and 9 (1.1 per cent) had urticaria which was also accompanied by low-grade fever. In only two cases were injections stopped before the 8-day treatment was finished. These two patients received injections for 7 days only because of the development of severe urticaria. Usually, however, when urticaria developed, the patient had finished the full treatment. Several of the patients with urticaria had an associated angioneurotic oedema but in no case did this last more than 5 days.

The occurrence of reactions was more frequent during the use of certain allotments of penicillin in beeswax and oil than with others. Though more troublesome to prepare and inject than aqueous solutions of penicillin, the fact that only one injection a day is required more than compensates for these minor difficulties.

Evaluation of treatment

The cases have been divided into four groups : (1) sero-negative primary syphilis, (2) sero-positive primary syphilis, (3) secondary syphilis, (4) reinfection or relapse following previous therapy for early infectious syphilis.

All patients delinquent for more than 3 months prior to the preparation of this paper were counted as lost at the present time for follow-up purposes. A few had become sero-negative prior to becoming delinquent, but in computing percentages the delinquent patients were subtracted from the total number treated in each group.

A number of patients still had positive serologic tests 6 months or more after treatment. The writers believe that most of these patients should not be regarded as treatment failures. Certainly those who had quantitative Kahn tests of 8 or less should not be so classified. This opinion is based on the writers' previous experience with rapid treatment or early syphilis where 2 to 3 years passed before some patients became completely sero-negative.

In the group treated for secondary syphilis 4 patients had Kahn titres of over 16 after the sixth month of follow-up. Two were retreated at the sixth month because of Kahn titres of 64; 2 had Kahn titres of 32 six or more months after treatment. All of these should be counted as definite treatment failures. Eight patients had Kahn titres of 16 when last examined six or more months after treatment. Although we do not accept them as definite failures, their present status is in doubt, and we believe they should be regarded as an indeterminate group. All patients with Kahn titres of 8 or less, six or more months after treatment, should in the writers' opinion be regarded as having a satisfactory status at the time of this report.

Relapses or reinfections

That proportionately fewer patients became sero-negative prior to relapse or reinfection in the secondary syphilitic group than in the sero-positive primary series is explained largely by the fact that patients with secondary syphilis usually require a longer time to become sero-negative following treatment than do patients with sero-positive primary syphilis.

The percentage of relapses or reinfections in the sero-positive primary group and the group with secondary syphilis is practically identical for the same period of observation, 12.6 per cent as compared with 11.0 per cent. The percentage of 6.8 relapses or reinfections in the sero-negative primary group is smaller than in the other three series. They were probably all reinfections.

It is of interest that most relapses or reinfections in all groups occurred during the first 6 months after treatment. It frequently appeared that patients were reinfected by sexual partners whom they had infected. This occurred in spite of educational programmes designed to prevent the occurrence.

Spinal fluid findings

Of the 802 patients treated, 766 had spinal fluid examinations at the time therapy was started. All of those examined in the sero-negative primary group had normal spinal fluids. Only 3 of the patients examined in the sero-positive primary series had abnormal findings of increased cells alone in the spinal fluid. In the series with secondary syphilis 46 of those examined had abnormal spinal fluid findings. Of these, 26 had normal spinal fluids when examined from 3 to 5 months after treatment and 17 have had no subsequent spinal fluid examinations. Of the 3 remaining patients, 1 continued to have increased cells and protein in the spinal fluid 6 months after treatment and had a blood Kahn titre of 32. This patient is one of the 2 to be retreated because of persistently high quantitative Kahn tests. Two patients continued to have abnormal spinal fluid findings and had infectious relapses, at which time their spinal fluid Wassermann tests and colloidal gold curves were strongly positive. Two patients who had normal spinal fluid findings at the time of their first treatment for secondary syphilis relapsed later at which time the spinal fluid findings were abnormal. It is interesting that the percentage of abnormal spinal fluids in the group treated for reinfections or relapses after previous therapy was only 5.2 per cent as compared with 10.5 per cent of the group treated for secondary syphilis.

Comparison of patients treated with one and two injections a day

The differences in results of the two schedules for injecting penicillin in beeswax and oil are not statistically significant. Certainly the data show

no advantage in giving two daily injections rather than one. With the exception of the groups treated for secondary syphilis where the percentages of relapses are almost the same (15.2 and 13.2), the single daily injection appears to have yielded better results than two injections a day. This is probably due to chance rather than to the actual superiority of one daily injection. The percentages of failures in all groups are no worse than with any other type of rapid treatment that the writers have used for a similar period of follow-up.

Romansky (M. J. Romansky and G. E. Rittman, *New England J. Med.*, **233**, 577-582, 1945) has shown that a single injection of 300,000 units of calcium penicillin in beeswax and oil maintains effective levels of penicillin in the blood for about 24 hours, and continues to be excreted in the urine for approximately 3 days. If this is confirmed by subsequent investigations, there is an actual therapeutic advantage in treating syphilis with penicillin in beeswax and oil rather than with aqueous solutions because of the prolonged action of the antibiotic.

Conclusions

The treatment of early infectious syphilis with a single daily injection of 600,000 units of penicillin in beeswax and oil for 8 days has proved unusually satisfactory to date. There is no apparent advantage in giving more than one daily injection of this preparation. Possibly smaller daily doses, if continued for more than 8 days, would prove even more effective, but the writers have no data at present on which to base such a conclusion.

A. B. R. C.

Penicillin in Beeswax and Peanut Oil: A New Preparation which is Fluid at Room Temperature: Absorption and Therapeutic Use

By HAROLD L. HIRSH

HARRY F. DOWLING

JEAN J. VIVINO

and

GEORGINE ROTMAN-KAVKA

(Abstracted from the *Journal of Laboratory and Clinical Medicine*, Vol. 32, No. 1, 1947, p. 34)

A NEW preparation of penicillin (Merck and Co., Inc.) incorporated in peanut oil and beeswax, liquid at room temperature, has been studied to determine its rate of absorption and its therapeutic efficacy.

The intramuscular injection of 1 c.c. containing 300,000 units of penicillin resulted in assayable concentrations of penicillin in the serum for twelve hours in 85 per cent of the patients studied, with measurable concentrations persisting for as long as twenty-one hours in 25 per cent. Following an intramuscular injection

of 2 c.c. containing 600,000 units, detectable concentrations were found in 90 per cent of the subjects at twelve hours and in one-third of the patients for twenty-four hours. An injection of 600,000 units subcutaneously resulted in detectable concentrations of penicillin in the blood for twenty-four hours in all but one of the subjects studied.

It is obvious that any modification of penicillin which will permit injections to be spaced at twelve to twenty-four-hour intervals will be advantageous, particularly in the case of patients with such diseases as subacute bacterial endocarditis or syphilis who have to be treated for long periods of time. Therapy is simplified in infections which require treatment for several days. This method of treatment is ideal also for patients with gonorrhoea since it can be carried out with one injection. The high serum concentrations obtained during the first few hours following injection make it likely that infections caused by organisms which are relatively resistant to penicillin can be treated satisfactorily by proper regulation of the dose and time interval. These advantages have been offset, in the past, by the difficulty inherent in the administration of penicillin in peanut oil and beeswax as prepared by the original Romansky formula. The writers believe that the modified preparation which they have used eliminates this difficulty in administration at the same time retaining all the other advantages of the original preparation.

Twenty-seven patients suffering from various infections were treated with doses varying from 300,000 to 600,000 units once or twice per day. The results were similar to those obtained with the use of other preparations of penicillin in beeswax and oil or with equivalent *per diem* doses of penicillin in aqueous solution.

The preparation was found to be easier to administer than the preparations made according to the original Romansky formula.

The Treatment of Early Syphilis (in Africans) with Penicillin Sodium

By MAJOR G. C. COCHRANE, R.A.M.C.

(Abstracted from the *East African Medical Journal*, Vol. XXIII, No. 9, September 1946)

PENICILLIN therapy in early syphilis requires hospitalization of approximately nine or ten days—including seven and a half days of therapy.

A total of 2,400,000 Oxford units is employed. This consists of sixty intramuscular injections of 40,000 Oxford units every three hours over a period of seven and a half days. Alternate buttock is used—the injections being given into the upper and outer quadrant of the gluteus maximus. A needle 2 to 2½ inches long about 20 gauge is used to make sure that the injection is being given intramuscularly. Treatment

should continue without interruption after its initiation.

No local treatment is applied to the primary sore except perhaps a saline dressing.

In obviously mixed infection (early syphilis and soft sore) sulphonamide cream or powder is used—depending on the size and the depth of the lesion.

The *Treponema pallidum* disappears rapidly from the lesions once penicillin therapy is started. The time varies from six to twenty-four hours—the average time being about fourteen hours. Average stay in hospital is ten days.

The Herxheimer reaction (in Africans) is practically nil—although it is found in this Command that over fifty per cent of Europeans have a Herxheimer reaction within twenty-four hours—and consists of pyrexia alone. Herxheimer reaction in Africans treated with penicillin sodium taken over a period of one year—0.09 per cent. These 0.09 per cent were all cases of secondary syphilis—the pyrexia ranging from 102° to 104° and generally starting from four to five hours after the first injection. The pyrexia subsided within twelve hours and treatment was continued without interruption.

It is interesting to note the serological response of seropositive early syphilis to penicillin sodium.

One hundred and twelve patients were 'followed up' for a period of six months; all the patients had early syphilis (Kahn ++++) and each patient received 2,400,000 units of penicillin.

1. After 1 month in 1.8 per cent of cases the Kahn became negative.

2. After 2 months in 47.5 per cent of cases the Kahn became negative.

3. After 3 months in 56.25 per cent of cases the Kahn became negative.

4. After 4 months in 78 per cent of cases the Kahn became negative.

5. After 5 months in 87 per cent of cases the Kahn became negative.

6. After 6 months in 98 per cent of cases the Kahn became negative.

Eleven cases failed to become negative during this surveillance period and the writer was unable to follow up these owing to releases on age and service grounds.

Chronic Vesiculitis as a Factor in the Production of Non-Gonococcal Urethral Discharges

By C. E. MARSHALL

(Abstracted from the *Medical Journal of Australia*, Vol. 1, 15th June, 1946, p. 846)

APART from gonorrhoea and intraurethral chancre which does occur from time to time the causes of a urethral discharge are legion according to the literature. In Australia it would appear that nearly all cases of non-specific urethral discharge can be attributed to one or more of the

following agencies: (i) filtrable viruses and pleuropneumonia-like organisms; (ii) secondary infection by a non-pathogen following chemical or mechanical insult; (iii) chronic vesiculitis and prostatitis.

The rôle of the filtrable viruses and pleuropneumonia-like organisms in the aetiology of non-gonococcal urethral discharges has been clarified by recent work in Australia; but the relationship between virus urethritis and chronic vesiculitis has not been clearly established. Because of the anatomy of the vesicle it is unlikely that chemotherapy would be of any great benefit in established vesiculitis even if the organism was susceptible to the drug. This is not to say that chemotherapy should not be tried in all cases of urethral discharge because although it has been proved disappointing it does appear to help in a small proportion of cases probably those of bacterial origin.

Apart from virus urethritis it is probable that saprophytes can play a part in the production of a urethral discharge. The male urethra normally harbours from 15 to 30 different strains of bacteria in 20 per cent of cases and these organisms may become pathogenic under various stimuli one of which is inflammation of the prostate and vesicles. The high incidence of chronic vesiculitis in cases of non-gonococcal urethritis is illustrated.

In the first group examined (i) an active urethral discharge was present, (ii) the gonococcal complement-fixation test gave negative results, (iii) macroscopic examination by the glass test was made, and (iv) the condition was a first infection. There were 57 patients in this group of whom 24 produced evidence of infection of the prostate and vesicles whilst 33 were normal.

In the second group examined (i) an active urethral discharge was present, (ii) the gonococcal complement-fixation test was not performed, (iii) a microscopic examination of wet specimens was made, and (iv) the condition was a first infection. There were 25 patients in this group of whom 11 were found to have chronic vesiculitis while 14 were normal.

In the third group (i) the patients were symptomatically cured and the urine was free from shreds, (ii) the gonococcal complement-fixation test was not performed, (iii) macroscopic examination was performed by the glass test, and (iv) the condition was a first infection. There were 27 patients in this group of whom 11 produced macroscopic amounts of pus from the vesicles while 16 were normal.

In the fourth group (i) the patients formed a miscellaneous group of those who were cured and those who had active infections, (ii) the gonococcal complement-fixation test was not performed, (iii) microscopic examination was made of wet specimens, and (iv) the condition was a first infection. There were 23 patients in this group of whom six excreted pus from the prostate and vesicles while 17 were normal.

A persistently positive response to the gonococcal complement-fixation test indicates a gonococcal focus of infection. It is also possible for some of these patients to have suffered from an anterior urethritis which was so mild as to escape notice at the time but which had nevertheless extended backwards to set up an indolent infection of the vesicles. This would then develop over a period of weeks only to manifest itself as a urethral discharge at a later date. The long incubation period of non-specific urethritis which varies from seven days to seven months (in one case) would favour this view. Chronic vesiculitis as a cause of protracted urethral discharge is emphasized.

The main symptom of chronic vesiculitis is usually a slight mucopurulent discharge from the urethra and pain may be present in the perineum radiating along the urethra and back into the rectum. The urine is often hazy in the second glass but may be fairly clear especially if blockage of the ejaculatory ducts results in poor drainage. Epithelial and leucocytic shreds are common. If the urine is clear the prostate and vesicles may be gently massaged; but the absence of enlargement or induration of the vesicles cannot be accepted as proof of the absence of infection. The fluid expressed by massage is caught in a specimen glass containing water. The normal secretion will diffuse through the water slowly as a bluish opalescent haze. Purulent material is yellowish-white and will plummet to the bottom of the glass because of the contained leucocytes. A cast of the vesicle may also be expressed. In the absence of pus macroscopically evident by the glass test a wet slide of the secretion may be prepared for microscopic examination. Any specimen containing more than six leucocytes in a dry high power field is suggestive of chronic vesiculitis and prostatitis. If no expression is obtained by massage it may be necessary to dilate the urethra gradually over a period of weeks with curved metal sounds and repeat the examination. Instrumentation or massage in the presence of turbid urine is dangerous. Irrigation of the anterior and posterior portions of the urethra is not essential if the urine is passed immediately beforehand.

The treatment of chronic vesiculitis is long and tedious and no patient can safely be promised a cure in less than two months. The main features are gradual dilatation of the urethra with curved metal sounds twice a week and the use of Kollmann's curved dilator if necessary. If the meatus is small a meatotomy may have to be performed before the larger sizes of sound can be introduced. This will prevent any unnecessary pain brought about by stretching of the meatus. Massage of the prostate and vesicles is carried out two or three times a week but not more often. The criteria of cure are absence of urethral discharge and shreds from the urine and absence of purulent material from a series of at least three massage specimens.

Penicillin in the Treatment of Gonococcal Infections

(Reprinted from a *Medical Newsletter* dated February 1947 released by The International Press and Publication Division of the U.S. Information Service, Washington)

THE results of treatment of acute gonorrhoea in 21,936 cases collected from the literature up to the end of 1945 were analysed, and some of the factors which may affect the cure rates were noted. Gross cure rates of between 92 and 95 per cent were obtained from the initial course of parenteral penicillin given in the doses most commonly used, namely, between 75,000 and 200,000 units, and these rates were not definitely related to the size of the dose within this range. Within the same dose range, however, there were fairly wide variations in cure rates reported by different observers. A dose of less than 75,000 units gave significantly lower cure rates except, perhaps, when penicillin X was used. There were also lower cure rates with an initial course of 200,000 units or more, but this was probably related to the choice of cases.

There were no important differences in the results obtained with similar doses given in aqueous solutions, by intermittent intramuscular injections or by constant or intermittent intravenous injections or by single intramuscular injections in beeswax-peanut oil or in water-in-oil emulsions. The results obtained with single injections of aqueous solutions, however, were definitely inferior to those obtained with the same number of units given in divided doses. It is possible that full doses of an effective sulphonamide, such as sulphathiazole or sulphadiazine, given for five days and supplemented by a course of 100,000 or 200,000 units of penicillin in divided intramuscular doses may give better results than similar doses of penicillin alone. Sulphonamide resistance of gonococci does not affect their sensitivity to penicillin.

The numbers of patients treated with oral penicillin are too few and the factors involved are too many to permit any final deductions concerning the efficacy of this form of treatment. Present indications are that a minimum oral dose of about 600,000 units or more given in divided doses at least one-half hour before meals may be necessary to achieve results similar to those afforded by the usual parenteral doses. Some focal gonococcal infections, particularly early and mild ones, yield readily to the usual course of treatment for gonorrhoea but severe and chronic ones probably require more prolonged treatment for cure and there may be residual symptoms from the tissue damage already done. Purulent arthritis may require local (intra-articular) injections of penicillin, surgical drainage of focal abscesses may be necessary before a complete cure is obtained.

(Meads, Manson and Finland, Maxwell: *Penicillin in the Treatment of Gonococcal*

Infections : Analysis of the Results Reported in the Literature Through 1945. *Am. J. Syph., Gonorr. and Ven. Dis.*, 30, 586, November 1946.)

Comparison of Response of Gonorrhœa to Sulphathiazole and Penicillin : Analyses of 144 Cases

By I. H. MAUSS

(*Lancet*, Vol. 66, March 1946, p. 65, as abstracted in the *Journal of the American Medical Association*, Vol. 131, 15th June, 1946, p. 635)

MAUSS treated 144 patients with gonorrhœa. Seventy-five patients, 66 women and 9 men, were given a total of 22 gm. of sulphathiazole over a five-day period. The first two doses were of 2 gm. each, given at an interval of 2 hours. Thereafter 1 gm. was given every 4 hours during the day until 22 gm. had been administered. Fifty patients of this group (68 per cent) were rendered negative after a single five-day course of this therapy. Eight required two or more courses, so that a total of 59 patients (77 per cent) were cured. Sixteen patients (13 women and 3 men) remained positive in spite of repeated treatment. Sixty-nine patients (55 women and 14 men) were treated with penicillin. Sixty-six (96 per cent) of them were rendered negative with a single course of penicillin (150,000 to 200,000 units) and on re-treatment with 300,000 units the remaining 3 (4 per cent) were rendered negative, so that 100 per cent were cured. Thirty-three of these patients had been sulphonamide-resistant, and all of them were cured after a single course of penicillin. The follow-up control of the patients treated with sulphathiazole showed that patients given sulphonamides should be observed for a minimum of three months before being considered cured. Many failures in this series would have been missed if observations had been terminated earlier. The number of initial penicillin failures in this series was too small to provide any valid idea as to how long the post-treatment observation should be continued routinely before patients are considered cured.

Steady Progress of Penicillin Development

New Processes to Extract Wonder Drug

By ROSEMARY DENSTON, B.Pharm., Ph.C.

(Reproduced from Release No. 597 dated 16th May, 1947, issued by the United Kingdom Publicity Services, New Delhi)

EVER since the discovery of penicillin by Sir Alexander Fleming in 1929, a steady progress has been maintained in the development of this wonder drug.

The news that the sodium salt of penicillin is now available in crystalline form for use in cases where maximum purity and stability are essential, marks another step forward in the field of medical research.

Penicillin has from the start proved singularly difficult to handle. The crystalline form, for instance, was made, only after many failures, by forming an organic base of the penicillin and then converting this to sodium salt. This process, though known for some two years, has only recently been adopted for mass production. It was, however, a most important discovery. Crystalline Penicillin Glaxo contains at least 90 per cent of penicillin II and the material has exceptional stability.

Paramount Value in Surgery

The advantages of the crystalline penicillin are very marked, especially in brain surgery, for it can be used in extreme concentration without risk of irritation. As permissible dosage increases, the powers of the drug appear sometimes even greater than was at first predicted. There is every reason to think that with the progress of research still more remarkable results in healing will be obtained.

The rôle played by British laboratories was, and remains, part of the penicillin story. By 1941 the paramount value of penicillin, above all in war surgery, was established beyond doubt, but Britain, then under constant threat of invasion, could not undertake large scale development of the drug. Research on mass-production techniques was therefore transferred to the United States.

Unfortunately, however, the submerged culture process, involving huge tanks, though plainly superior to 'jug and bottle' methods, was obviously a long-term policy, whereas the vital need for the drug was now. In 1943, with D-Day already foreshadowed, Glaxo Laboratories, whose research staff had been at work on penicillin problems from an early stage, received instructions from the British Government to obtain the greatest possible immediate output.

Commercial Production

Since 1941 experiments and production had been based on the surface or single unit method, which consisted of growing the mould in a flask, from which, after seven to nine days, the active liquid could be harvested. So far little more than experimental quantities had been made in this way; but in February 1943, by simply multiplying single-flask technique, Glaxo became the first to start production of penicillin on a commercial scale.

During World War II, at least 80 per cent of British penicillin was produced by these laboratories, one factory alone handling 300,000 separate flasks. Though quality was the need, quality with quantity was the aim, and it was not long before an 80 per cent pure product was consistently maintained.

In 1945, a British team of chemists, profiting from considerable experience in the use of the freeze-drying technique for other preparations, adapted and finally perfected this process for

use in the final stage of penicillin production—the drying of the purified substance. Ultimately the whole Glaxo penicillin output was freeze-dried at the main factory. A minor diversion occurred here, when a flying bomb hit the drying plant section, and buried some of the plant. The devastation was considerable, but production was resumed in 24 hours.

Considerable as the success with surface methods had been, deep culture had such obvious advantages over the single-unit technique that early in 1943 a special Fermentation Division of the Company had been formed. With the co-operation of the Ministry of Supply, a site was secured for a new factory to be devoted to the production of penicillin. Building was begun shortly after the war ended, and despite the difficulties of that period, production was begun at the beginning of 1946.

Chemical Structure

British production figures had been mounting steadily, but the advent of, first, the new Glaxo factory at Barnard Castle, a north country mill town, and then the factory of the Distillers' Company at Speke, near Liverpool, made future quantity-supplies assured.

During the rapid progress in the production of penicillin by fermentation, a team of British and American chemists were attempting to discover the exact chemical structure of the drug. This work, it was hoped, would not only help to explain its unique properties, but make possible its synthesis. Research showed that there were at least four penicillins, all with the same basic formula, but with slight variations in the side chain. In England they are known as penicillins I, II, III and IV.

Penicillin I was the form obtained in largest quantity when, as in the first surface culture techniques, entirely synthetic food was provided for the mould. Penicillin II is formed in quantity by both deep and surface culture if the 'food' contains corn-steep liquor—a by-product of the starch industry. Penicillin III occurs in small quantities from all corn-steep liquor methods of manufacture, but since it is not readily soluble in chloroform (a usual method of extraction) it is generally eliminated from the final product. Penicillin IV is formed mainly by deep culture production with the newer mould strains. It seems curiously ineffective therapeutically, probably owing to its rapid destruction by the body.

Fortunately research workers were quick to realize this. Changes were made in the 'foods' and in the processes of extraction, so that now penicillin IV is present in only very small proportions, penicillin II predominating in the final product. Dihydro-Penicillin F is a more recent discovery and probably the forerunner of other penicillins.

High Level of Purity

Even in surface-culture days, British chemists maintained a level of purity between four and

five times that of the standard legally required. At the present time this is 300 units per milligram, and penicillin Glaxo has invariably a strength of at least 1,200 to 1,500. When the international standard was established, and it became desirable that a quantity of standard substance of similar purity should be available in Britain, it was thought at first that there was not enough penicillin of the requisite quality. Glaxo Laboratories, however, were able to provide 30 grammes of material at the necessary purity level, and the actual penicillin now in use as a British standard has a potency of 1,600 units per milligram.

The maintenance of a high standard of control depends to a great extent on assay technique. This is a field in which the British team have done good work. In particular, a most useful modification of the *Staphylococcus aureus* plate method was devised in the Greenford Laboratories. At Barnard Castle, research is progressing steadily.

Meanwhile, chemists and biologists are pushing ahead, seeking for other mould-produced substances which may prove effective against conditions not affected by penicillin. Eventually, science may succeed in harnessing the defence substances of many small organisms for the defence of man—and this on such a scale that even our most stubborn ills will be finally conquered.

Paracolon Bacilli and Their Relation to Urinary Tract Infection

By I. G. SCHAUB

(Abstracted from the *Journal of Laboratory and Clinical Medicine*, Vol. 31, September 1946, p. 958)

PARACOLON BACILLI appear to be aberrant forms of *Escherichia* and *Aerobacter* which differ from the typical coliform organisms in their failure to ferment lactose promptly with acid and gas. Other variations may also occur, so that a large number of culturally different paracolon bacilli may be encountered.

Culturally paracolon bacilli may resemble *Proteus*, *Salmonella*, *Shigella* and *Eberthella*, and are frequently mistaken for members of these genera. They may usually be differentiated biochemically, but in some instances serologic tests are necessary.

In one year, 100 strains of paracolon bacilli were isolated from urine specimens from fifty-seven women patients, representing 3.02 per cent of the total number of urine cultures received in the laboratory during 1945 and 4.3 per cent of the positive cultures.

Fifty-one histories were studied to determine the significance of paracolon bacilli in the female urinary tract. In 50.9 per cent of the cases there were symptoms of pyelitis; in 21.5 per cent, symptoms of cystitis. White blood cells only were found in 5.8 per cent of the

patients, and 21.5 per cent showed no signs or symptoms of urinary tract infection.

In 52.9 per cent of the cases the paracolon bacilli were associated in the urinary tract with either *Escherichia* or *Aerobacter*. If only the instances in which more than one culture was taken are considered, then this association between typical and aberrant coliform bacilli occurred in 87.1 per cent of the cases.

It has been suggested that these paracolon bacilli may, in a number of cases at least, be the result of variation in the urinary tract, that in such cases the original infecting agent was a typical *Escherichia* or *Aerobacter*, and that, under conditions as yet undetermined, variation occurred in these typical coliform organisms with the resultant appearance of paracolon bacilli in urine cultures.

Oral Penicillin Treatment of Gonorrhœa

(Abstracted from the *Urologic and Cutaneous Review*, November 1946, p. 689)

A. COHN, B. A. KORNBLITH, AND I. GRUNSTEIN (*American Journal of Syphilis, Gonorrhœa and Venereal Diseases*, September 1946) report on the results in 111 patients with gonococcal infections treated with oral penicillin. Best results were obtained with a group of 50 patients who received a total amount of 600,000 Oxford units of penicillin in divided doses hourly over a period of seven hours. Treatment failed in four patients in this group.

An assayable amount of penicillin could be detected in the serum for about an hour after the oral administration of 50,000 or 150,000 units.

Because of the four-fold amount necessary to obtain results comparable to parenteral use, oral penicillin does not appear to be the preferable method of treatment of gonorrhœa at the present time.

A. B. R. C.

Chancroid Therapy With and Without Sulphathiazole

(Abstracted from the *Urologic and Cutaneous Review*, November 1946, p. 688)

V. C. HARP, JR. (*American Journal of Syphilis, Gonorrhœa and Venereal Diseases*, July 1946) points out that the cardinal principle in the treatment of chancroid is not to interfere with the diagnosis of syphilis with which chancroid is commonly associated. The second important consideration in the treatment of chancroid is cleanliness.

Sulphathiazole (or sulphadiazine) taken orally in doses of 1 gm. four times daily with an initial dose of 4 gm. is recommended by Army directives. This can be begun immediately since it does not interfere with dark-field examinations

for several days at least with examinations for *Hemophylus ducreyi* in the ulcer. *T. pallidum* and *H. ducreyi* have often been found four days or longer after the patient has started taking sulphathiazole.

In the author's study, 350 cases of chancroid were analysed with regard to the incubation period, the size and character of the penile ulcer, and the incidence and character of the complicating lymphadenitis.

Penicillin must not be used in the treatment of penile ulcers unless a positive diagnosis of syphilis has been made. Most patients will recover rapidly without the use of any specific therapeutic agent. Sulphathiazole almost invariably prevents an ulcer from becoming larger and seems to ensure progressive healing which may be due to control of secondary infection rather than to direct action on *H. ducreyi*. The data indicate, however, that sulphathiazole should be used in the treatment of every patient with chancroid.

A. B. R. C.

Some American Ideas on Venereal Disease Control

By R. R. WILCOX

(Abstracted from the *Bulletin of Hygiene*, March 1947, Vol. 22, p. 184)

WILCOX points out that the four main points in a V.D. control programme are (1) controlling sources of infection; (2) prophylaxis; (3) observation and treatment of contacts and patients; and (4) prevention of default. Education is necessary as a first step.

In New York a certificate of freedom from V.D. is essential before marriage; pregnant women have their bloods tested for syphilis; V.D. is notifiable and treatment is compulsory; and women arrested for prostitution are subject to examination and treatment. Most cities have a V.D. control section and every effort is made to trace contacts. In Chicago, under the well-known Dr. Bundeson, bar-keepers are invited to co-operate and if they do not do so are liable to be put out of business by methods which would hardly be acceptable in Great Britain; prophylaxis is not pressed on the civilian but servicemen on furlough are well provided with 'pro' stations; 4,000 reports of contacts or cases are dealt with monthly. Propaganda is forcefully employed; trams and buses carry such slogans as 'Thousands have V.D. and don't know it. Are you one of them?', 'Don't be an Ostrich—Face the Facts—V.D.', 'Easy to pick up V.D.' A new type of advertisement is the movie juke box which alternates entertainment reels with V.D. control messages; these are provided free and last ten minutes. In addition a quarterly periodical entitled 'V.D. Topics' is published. The list of activities would not be



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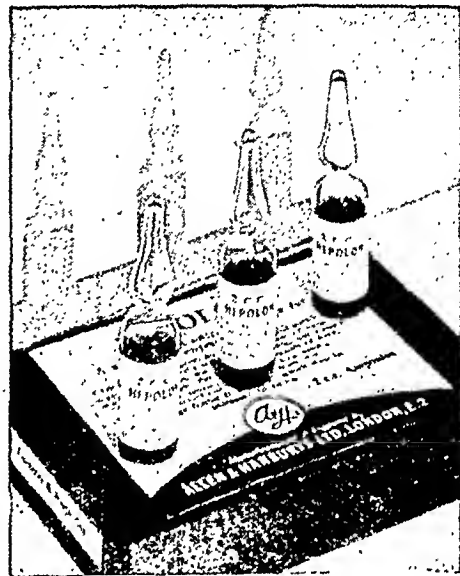
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complete without mention of the American Social Hygiene Council which corresponds to the British Social Hygiene Council and the Central Council for Health Education.

Results have on the whole been disappointing. Nevertheless the advice given by Stokes 'We must move against promiscuity rather than, or in addition to, disease' seems particularly apposite.

In spite of all their activities it seems probable that V.D. is more prevalent amongst Americans than among Britons, but it is no less true that Americans are more promiscuous than Britons, at any rate so far as service men are concerned.

[Due to the limit on the size of the journal some topics prepared for this number could not be included. They will follow in the next issue.—EDITOR, I.M.G.]

Reviews

PENICILLIN THERAPY.—By J. R. Goyal, M.B.B.S. Second Edition. 1947. Published by Medical Review of Reviews, Delhi. Pp. ii plus 177

THE book deals with the subject with too much of details. Findings of numerous workers are given. It would have been better if unnecessary details were omitted.

Action of penicillin on *Sp. pallida* is given concisely. In infants administration of penicillin with milk is a useful plan.

Test of sensitivity of micro-organisms to penicillin, and estimation of penicillin content of blood and exudate are given in a simple way which will be of practical help.

The superiority of sulfa drug over penicillin in meningococcal meningitis and of penicillin over sulfa drug in nephritis has been stressed. Improvement by penicillin in meningovascular syphilis and neurosyphilis with time limit of 120 days for maximum effect in cerebrospinal fluid has also been stressed. Superiority of penicillin in treating pregnant women and in preventing congenital syphilis (by two courses) is brought out and this is a great advance.

The chapter on streptomycin deals with salient features. It is not understood why streptomycin should be injected every 3 hours instead of every 4-6 hours.

A. B. R. C.

VENEREAL DISEASE : ITS PREVENTION AND CONQUEST.—By George Ryley Scott, F.Ph.S. (Eng.), F.Z.S. Publishers : Torchstream Books, London, S.W.19. Revised Edition. 1947. Pp. 80. Price, 3s. 6d.

In this booklet the author gives considerable sound information to the public, and manages to have a few digs at moralists and include a

few points in defence of prostitutes. With the latter themes we do not agree.

Prophylaxis includes all kinds of devices, mechanical and chemical.

The book begins with stressing danger to American troops in England. One wonders whether the inspiration is partly propitiatory. Surely, the incidence of venereal diseases was higher in America than in England before the war.

S. D. S. G.

ESSENTIALS OF SYPHILOLOGY.—By Rudolph H. Kampmeier. Second Edition. 1946. Blackwell Scientific Publications, Ltd., Oxford. Available from Messrs. Macmillan & Co., Ltd., London, W. C. 2. Pp. xvi plus 465 with 87 Illustrations. Price, 25s. net

THIS book is a departure from the usual literature on syphilis. It is written for medical men other than specialists in dermatology and serology. It teaches syphilology boldly, without the conventional restraints: negative WR in secondary syphilis does not occur; provocative test gives no help; a small inoculation of spirochaetes may produce the disease without a chancre (established by animal experiments and cases); treatment is not necessary always and an old man with a history but nothing more than a positive WR is to be congratulated, not treated; and a natural cure is possible. These are the samples of goods the book delivers.

The treatment gives in all details all that is known at present: the conservative treatment for cases physically below par; the fever treatment; the intensive treatment which perhaps has been too intensive in its trial at the Vanderbilt Medical School; the penicillin treatment which of course is still to be weighed (one feels it will not be found wanting); and a combined treatment. Attention has been drawn to the therapeutic paradox and its prevention (scarring in healing may ruin a structure).

The unique features of the book are: (1) Case reports. They, with appropriate pictures and colloquial expression, take the reader, magic carpet wise, to the clinic at Vanderbilt and enable him to hear the author demonstrating. (2) Statistics of the various incidences of syphilis. They have been collected by up-to-date methods and in recent years. Syphilis of the stomach is not a rarity, for instance.

What makes the book specially useful in India is that the author's clinic has collected its material mostly from patients who are either 'indigent or fall into the lowest income levels'. Such are most of our hospital patients in India.

A complete divorce between syphilology and dermatology is typified under annular syphilids (pp. 128-130). The usual distinction from pityriasis rosea is not even mentioned. Perhaps the distinction will save time and reassure the patient. The author's policy, however, is compatible with the omission: he will not call any

rash syphilitic without a serological test which according to him is bound to be positive in secondary syphilis. One agrees. A case of syphilis, however, may develop pityriasis rosea during treatment and may feel disappointed with the treatment. Dermatology cannot be divorced from syphilis conveniently.

The text is remarkably free from errors. The paper could be thinner.

References are plentiful and given, without cutting across the thread of thought, with full titles of the communications.

The book is a notable contribution to the knowledge of syphilology and should be widely read. The price is reasonable.

S. D. S. G.

**MODERN DERMATOLOGY AND SYPHIL-
OLOGY.**—By S. William Becker and
Maximilian E. Obermayer. Second Edition.
1947. J. B. Lippincott Company,
Philadelphia, London and Montreal. Pp.
xxx plus 1017 with 484 Illustrations, many
in colour. Price, £5.10.0

THIS book deals with the two subjects separately instead of including syphilis in dermatology as has been done almost universally, so far, everywhere, at least in works written in English.

Both the items are treated fully. The headings and the 'conference style' contribute in no small measure to the clarity of the exposition.

The description of syphilis runs along the usual lines. On certain topics, however, the authors have slightly divergent views which are duly stressed: (1) Ninth-day erythema caused by the arsenicals used in treatment may be a precursor of the dreaded exfoliative dermatitis. Arsenic must be stopped. (2) Every baby of a mother suspected to be syphilitic may not be put on treatment immediately after birth. (3) Thiosulphate may be really useless in arsenical poisoning due to treatment.

The electron-microscope photograph of the *Spirocheta pallida* is duly given as is done in other books. No adequate explanation, however, is available as to why the coils are almost lost. Incidentally, treponema should be preferred to spirochæta and *Leptospira icteroides* is not the causal organism of yellow fever.

In dermatology more emphasis is laid on personal views: this is usual with dermatologists. Lentigo, for instance, is distinct from freckles and may be looked upon as a serious condition.

The present edition includes tropical diseases which makes the book more useful in India than the previous edition.

Reiter's disease and Behcet's disease are not in the index.

The get-up is disappointing. The paper is too glazed and too thick to lend itself to a durable binding, writing on the margin, or even marking of passages. The index is almost

unreadable by mature men who alone will buy and read a book of this size. The poster-like page glued between pages 946 and 947 is unsightly and inconvenient to negotiate. The weight is over seven pounds. One should like to have in one's book case a copy of this book in a better get-up.

S. D. S. G.

**HANDBOOK OF DIAGNOSIS AND TREAT-
MENT OF VENEREAL DISEASES.**—By
A. E. W. McLachlan. Third Edition. E. &
S. Livingstone Ltd., Edinburgh. Pp. 375.
Price, 15s.

A book handier than this handbook will be difficult to find. In 375 small pages the author has described in a lucid way all that must be known of the venereal diseases. Illustrations are excellent. Most of them are in black and white and some in colour.

Marginal headings save waste of time in introducing the items.

Several non-venereal conditions causing confusion in diagnosis are included.

Some faults usually characteristic of the first edition are still present. Examples: (1) Pages 169-170, a line is out of place. (2) Page 200, from two doses, after the decimal point, a zero is missing. (3) *Trichomonas* 'infestation' should be infection.

Then there are some obscurities. Example: Page 125, para 3, sentence 4; the fact that the disease is not confined to a 'single bone' has no connection with the 'whole circumference of the shaft'.

There is a need for a critical perusal of the script for the next edition.

S. D. S. G.

PENICILLIN IN VENEREAL DISEASES.—
By K. D. Lahiri, M.B., B.S. 1947. Himalaya
Publications, Patna. Pp. 108

THIS booklet mostly contains summaries from articles on the subject in different journals, the names and years of which are given in the text, with no detailed list at the end. The author also adds some of his experiences in practice and the modifications of treatment.

There seems to be too many chapters, some of which could conveniently be amalgamated. The rationale of time-dosage scheme could better be discussed in more detail. There is no reason given as to why an intramuscular injection is better than an intravenous injection; in other words, the importance of sudden high peak of penicillin in blood after an intramuscular injection that can attack the organisms in hiding is not stressed. Rather 'uniform content' (p. 30) as advocated is misleading as it speaks for intravenous injection.

At places mention has been made of special suitability of certain modes of treatment in India without much reason for mentioning India: they are suitable for other parts of the world

also. No mention is made of treatment with 6 lacs of penicillin in oil a day in one shot and of crystallized white penicillin which keeps at room temperature. That the potency of penicillin is not affected in the presence of pus as stated on page 40 requires a proof or the test of time.

The text is obscure in parts and there are some printing mistakes.

A. B. R. C.

CAUSES AND CURE OF STERILITY.—By K. V. Mathew. Published by Health Book Stall, 7, Krishnan Koil Street, George Town, Madras. Page 102. Price, Rs. 3-12

THE book, though small in size, deals in an efficient manner with some practical methods based on the writer's medical experience. The chapter entitled 'Hormones' is particularly useful. Some of the examples cited are instructive. The book will be useful to those for whom it is meant. A few printing mistakes occur.

A. B. R. C.

Correspondence

THE RATIONALE OF MALARIA THERAPY IN LATE LOCALIZED SYPHILIS WITH PARTICULAR REFERENCE TO GENERAL PARALYSIS OF THE INSANE

SIR,—At the discussion following an address read before the Medical Society for the Study of Venereal Diseases, Colonel Burke (1931) remarked that what was needed in modern syphilology was a little more imagination and a little less bowing before tradition and the consecrated teaching of the arid textbook. The present writer quotes these words both as apology and excuse for the following theoretical considerations.

Ironside (1925) after discussing the mechanism of cure and rejecting such theories as high temperatures being inimical to *Sp. pallida*, and antagonism between malaria and syphilis, states 'the true mechanism has probably to do with the specific effect of some protein which the disintegrating malaria parasite delivers into the blood . . . and that the destruction by quinine of large numbers of malaria parasites sets free a considerable quantity of soluble antigen, which provokes, by stimulation of the host's tissues, the formation of immune bodies. It is probable that this immune substance has some prejudicial effect on the spirochæta'.

There are two objections to this theory. Firstly, it has been shown by Simpson and Kendell (1941) that physically induced pyrexia is just as beneficial as malaria. These authors quote Wagner-Jauregg—the father of malaria therapy—as admitting that the treatment of

paralytics with physically induced fever gave a number of full remissions as great or greater than malaria. Secondly, if the formation of these hypothetical immune bodies is harmful to spirochætes in late localized syphilis, why is it not equally beneficial in early generalized forms of the disease?

Simpson (1936) and Simpson and Kendell (*loc. cit.*) stress the importance of high temperatures in destroying spirochætes, but that fever alone cannot kill the spirochætes is evident by the fact that these workers found that in early cases of syphilis, fever actually did more harm than good. They state: 'At the outset of these experiments it was decided to institute control studies to determine the efficacy of fever therapy alone . . . after six patients (with early and secondary syphilis) had been treated solely with a total of 50 hours of fever, it was deemed unwise to continue with this part of the experiment since two of these patients developed clinical relapse' (cutaneous rash).

These paradoxical results—benefit in late localized syphilis and harm in early generalized syphilis—call for an explanation which has not yet been forthcoming.

Localization of disease is a well-known phenomenon demonstrating that pathogenic organisms migrate to weakened or injured tissues. Thus Burrows (1932) cites instances of abscesses developing after hypodermic injections, in cases of typhoid, pneumonia, puerperal sepsis, etc., in which the causative organisms of the original diseases were isolated in pure culture from the abscesses. The readiness with which tuberculosis will attack an injured joint is a similar example of migration to weakened tissues. Syphilis acts in the same way, and Burke (*loc. cit.*) states: 'It would be generally agreed that trauma had a distinct influence in determining the sites of syphilitic processes'.

Now, if local trauma can cause localization of disease it seems probable that general trauma (fever) will cause generalization of a localized disease. This indeed is evident in leprosy, for example, where leprotic fever frequently results in invasion of the blood stream by the bacilli. The following facts support the theory that fever is beneficial in G.P.I. because generalized trauma lures the spirochætes from out of the central nervous system into the body tissues:—

1. Fever may cure G.P.I. but it does not cure the underlying syphilis. The Wassermann reaction of the C.S.F. readily becomes negative after malarial treatment, but with insufficient treatment when patients relapse mentally; C.S.F.'s, without exception, revert to positive. This suggests migration to and from the central nervous system.

2. According to Greenfield (1928) spirochætes disappear quickly from the brain in G.P.I., after malaria. Since the syphilis has not been cured the spirochætes must be elsewhere.

3. With the possible exceptions of penicillin and tryparsamide, chemotherapy by itself is of

no value in G.P.I., but after malaria, chemotherapy by bismuth and arsenicals is of undoubted value. This may be, as has been suggested, because the fever renders blood vessels of the brain more permeable to the drugs; but in view of the disappearance of the spirochætes from the brain, the possibility that the spirochætes have migrated to other tissues of the body where they are more readily assailed by the drugs, seems at least as likely an explanation.

4. Indians very rarely suffer from G.P.I. The view that the Indian strain of syphilis differs from that of other places in being purely viscerotropic cannot seriously be maintained. Europeans acquiring syphilis from an Indian source may develop G.P.I. In addition, the European strain of syphilis must have been frequently introduced into India and *vice versa*. The explanation may well lie, not in differing strains of spirochætes, but in the different communities affected. Generally speaking, the European is a robust person, well nourished; literate; probably a brain worker and one to whom syphilis spells social and moral disaster. His brain, therefore, is the comparatively 'weakened tissue', and accordingly, in a small percentage of cases, the European syphilitic develops G.P.I. With the Indian exactly the reverse holds good. The Indian is of poor physique, undernourished, usually illiterate and generally a manual labourer; malaria, hookworm and a host of other diseases tend to lower his physical vitality. His body is the 'weakened tissue', the spirochæte has no inducement to go elsewhere and, accordingly, the Indian escapes G.P.I.

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Yours, etc.,

A. G. BROOKS, I.M.D.

CENTRAL RESEARCH INSTITUTE,
KASAUJI.

GONORRHOEAL STRICTURE OF THE MALE URETHRA

SIR,—Cases of urethral stricture are not uncommon in Bengal. A specialist, during his practice, is sure to come across a fairly good number in a year. In Europe, congestive or spasmodic types of stricture are common; but stricture due to organic changes in the urethra is becoming rare. Reasons are obvious. Firstly, average peoples of the West possess good

vitality; secondly, they do not suffer from pseudo-sense of morality, hence they are conscious of the value of early and systematic scientific treatment; thirdly, they are used to drinks which cause natural flush of the urethra; fourthly, climatic effect retards the progress of the disease.

In India, particularly in Bengal, the statistical data are incomplete and therefore misleading. On the strength of the so-called available statistics, no scientific inference about the percentage of stricture urethra cases can be correctly ascertained, which, in my opinion, should neither be exaggerated nor underestimated.

From 1933 to 1946, the old records of the Venereal Department of the Campbell Hospital alone prove that out of a total number of the attending cases suffering from chronic gonorrhœa 7 per cent had stricture. Early cases of stricture with slight symptoms are not included in the above list. Another remarkable feature of the records is that this kind of organic stricture is more confined to poor, illiterate wage earners, less common amongst the literate persons belonging to the poor middle class and least among the rich. Another important fact is noticed that all severe types of stricture had a history of suffering from chronic gonorrhœa over eight years or more, while less serious types of strictures developed five years after the infection of gonorrhœa. Formation of stricture in the urethra, as the records say, seldom takes place before the fifth year. This, I should confess, must not be accepted as axiomatic truth; but it may throw some light on future researches about the period stricture in urethra contaminated with gonococci takes to develop.

Yours, etc.,

BENOY SINHA, M.B.,

Surgeon, Venereal Department, Campbell
Medical School Hospitals, Calcutta

V.D. CAMPAIGN IN CALCUTTA

SIR,—I am sending the following lines to you to register my disapproval of the way in which the present V.D. campaign is being conducted.

1. The institution of the campaign is indeed a mystery. So much so, that at one time the popular belief was that the whole affairs were undertaken for the benefit of the American soldiers. This obviously is untrue.

2. The committee itself is not immune to suspicion. The Government did not invite the members of the medical profession to work in the committee nor was the nomination announced before the campaign was started.

3. The campaign has gone on for the last three years but no scientific reports concerning the disease have yet been published.

4. In a Government campaign like this, the medical profession expects to be enlightened about the latest development in diagnosis and treatment of the disease. Not a word of information regarding these points has been mentioned

in the Government bulletins issued by the Director of Social Hygiene.

5. The press propaganda about the campaign seems to be extravagant causing a waste of public money. This may benefit the educated but the illiterate mass is the least helped by such kind of propaganda. This should be modified and public money should be diverted to improve the scientific aspects of the campaign.

To conclude, I hear that some time back the Imperial Serologist sent a skeleton of a scheme for the V.D. campaign. May I know what is its fate?

Yours, etc.,

M. SARKAR, M.B.,

Councillor, Calcutta Corporation.

Calcutta,

10th October, 1947.

POINTS FROM LETTERS

I. CAPTAIN N. B. DUTT, M.B., I.M.S. (retd.) in a letter draws attention to : (1) The erection of huge signboards painted with multiple colours in prominent places on main roads advising the public to avoid venereal diseases. (2) The indiscriminate advertisements with the face of a pretty woman, a flower and an insect in journals and newspapers which are a waste of public money. Extensive newspaper propaganda, production of films, distribution of printed pamphlets or campaign through social workers may amuse a debauch or a prostitute but no self-respecting infected person however educated or poor will utilize those advantages, with a view to shunning publicity. (3) Ill-equipments of clinics, methods of treatment, want of indoor arrangements for complicated cases, lack of publication of scientific reports, adequate measures to detect freshly imported cases or rounding up of infected persons for sterilization, etc., are the grievances requiring attention for the improvement of the present anti-V.D. campaign. The campaign should be thoroughly reconstructed by a strong committee of eminent specialists.

II. In a letter on 'Combat With the V.D.' Dr. N. K. Nag, M.B., writes as follows :—

Owing to certain social customs, e.g. polygamy, early marriage, no widow re-marriage, purdah system, etc., Europeans have got peculiar conception of low Indian morality. Hence, they think, prevalence of the venereal disease is very high in the country. This is, in my opinion, a wrong idea. At the same time, underestimation of V.D. is equally mistaken. In spite of its three years' career, the present Government campaign against the V.D. has failed to collect reliable statistics of the diseases.

Since last war, the curve of morality in this country has gone down. In big cities and towns, hideous display of sensuous pleasure was witnessed; our rural areas were also not immune

from voluptuous scenes sponsored by foreign soldiers. To add to this, co-education, free association of men with women, cinemas, hotels, etc., have evidently encouraged sex-promiscuity in India, which is undoubtedly a cause for the spread of the diseases.

The present anti-V.D. campaign is the first of its kind launched in this province if not in India. Indeed, we need a strong and ceaseless measure to wage war against the venereal diseases. This is a long-felt want, and both the public and the medical profession welcome it. To maintain our national health or to keep the youth of our country free from the infection of the V.D., the present anti-V.D. campaign deserves adequate support from the Government. Financial difficulty should not be the cause of the abolition of the campaign.

In tracing the genesis of the Government anti-V.D. scheme, the Director of Social Hygiene, who describes himself as 'a medical practitioner of Calcutta with high medical qualifications and considerable experience in venereology', in one of his bulletins has made a statement that 'In 1938, free treatment was first introduced in the Medical College Hospital by the present Director'. This is not true. Both the Calcutta Medical College and the Campbell Medical School Hospitals have been giving free treatment of the V.D. under specialists since long before 1938.

Regarding the advisory committee of the campaign, I take a strong exception to it. The birth of the committee is indeed shrouded in mystery; its selection of members is conspicuous by the absence of specialists or serologists; and its activity is equally obscured from the sight of the public. This committee has so long led an unobtrusive career like an Arab princess in the harem of the secretariat. This committee showed all along an attitude of stoic indifference to the Director, in his commitment of multiple breaches of medical ethics, under the plea of propaganda which indeed caused sensation some time back among the members of the medical profession.

In the defence of V.D. training course, the Director has cast unfair reflection on the teaching of medical institutions and the knowledge of medical practitioners in venereology.

Propaganda and publicity have no doubt educative value, but the scheme adopted by the Director is so wide in nature that it is highly expensive; it has failed to serve the purpose for which it is intended. Only the educated few are benefited; the response from the illiterate is not so satisfactory. This is a waste of public money.

Legislative measures referring to the prohibition of quackery and compulsory treatment of infected persons are sound proposals made by the Director. Abolition of brothels through legislation may be possible but it is not desirable. In the West, brothels have practically disappeared, but prostitutes in private garbs are

freely moving about in night clubs, hotels, cinemas, dancing halls, etc. Sterilization of prostitutes and infected men may be possible by the threat of legislation.

Treatment of the V.D. in the evening is arranged, according to the Director, just to 'suit the convenience of patients'. This is an excuse without justification.

Due to scientific and moral reasons, evening treatment should be discarded. Any allowance to a V.D. patient for his personal sterilization is otherwise an encouragement to sexual indulgence. A V.D. patient should not be a pet boy of the Government. Besides, intravenous injections, in the night, to exhausted patients and their reactions afterwards, should not be ignored. Report of accidents are known to me. Preparation of patients before injection should not be ignored.

With the exception of one or two, the so-called V.D. clinics are not well equipped; they offer no treatment other than injections and distribution of tablets. They work like ablution centres. Venereal departments attached to teaching institution should have facilities for researches.

There is no provision for indoor beds at present.

The attention of the Government may be drawn to the scheme submitted by the Imperial serologist.

III. A communication entitled 'Prevention of the V.D. through social means' has been received from Dr. Benoy Sinha, M.B., Surgeon, Venereal Department, Campbell Medical School Hospitals, Calcutta. Dr. Sinha's summary of this communication is given below :—

1. Indifference of the society due to pseudo-sense of morality is responsible for insidious spread of the venereal diseases.

2. There is no real scientific organized prevention campaign against the venereal diseases, the prevalence of which in India should not be dismissed as a low figure; on the other hand, the mischief in our country due to the V.D. as a post-war problem is considerable.

3. No campaign is worth organizing unless an accurate map of infected areas is drawn up.

4. Susceptibility to sexual temptations rises at the age of puberty and reaches its peak between 25 and 30 years of life. Hence this is the most vulnerable period of life which through home influence, marriage and State protection should be guarded against the danger of infection.

5. Public offices, commercial quarters and industrial centres, if statistics is investigated, actually suffer an annual loss to a great extent on account of sickness among workers due to the sexual diseases.

6. If promiscuous sexual union is controlled, prevalence of the venereal diseases in the society is positively checked.

7. The modern age is extraordinarily crazy over indiscriminate sexual pleasures. With the

advancement of civilization, morality in the society has crossed the limit of decency, and ingenious devices are designed to feed human lusts.

8. Sex in man, as in animals, is an instinct difficult of control at times. Repression or suppression of this powerful instinct through forced celibacy or legal measures is sure to end in tragic failure.

Shameless exploitation of the reproductive organs in commercialized form is widespread which can be reduced to a relatively small volume through moral elevation, improvement of economic condition, and environments, social reformation and positive provisions for good home comforts for all persons belonging to the State.

9. Humanity demands a complete co-ordination of politicians, scientists, eugenicists and social reformers in a fight against the venereal diseases.

This is a war justifying a concentrated joint effort of whole mankind irrespective of races, colours and classes.

10. Teaching of sex psychology and sex hygiene is advisable only to grown-up boys and girls advanced in general or special courses and where co-education is introduced. Children should not, through a direct method, receive education on sex.

Any Questions

SITE OF LESIONS IN PRIMARY SYPHILIS

SIR,—I shall feel grateful if you could enlighten me about the following :—

1. Percentages of cases showing primary chancres on different sites—prepuce, frenum; coronal sulcus and scrotum, penis (shaft, root, glans and meatus), and extra-genital chancres.

2. Any reference from the literature on the subject.

I have got 'Stokes', 'Harison' and 'Lees' with me but none of them gives percentages of cases showing primary lesions in different sites. Reference about primary lesions in women is there all right.

Yours, etc.,
BALBIR SINGH,
MAJOR.

MAIN HOSPITAL,
JAMSHEDPUR.

[The following extracts may be useful :—
DISEASES OF THE SKIN.—By James H. Sequeira, John T. Ingram and Reginald T. Brain. J. & A. Churchill Ltd., London. Fifth edition, 1947. Page 528

Genital chancres in the male occur on the side of the frenum, on the prepuce and glans,

and in the sulcus behind the glans. In rare cases the meatus is the site, and urethral chancres have been observed. Occasionally, the chancre develops on the body of the penis, or on the scrotum, or the skin over the pubes.

Extra-genital chancres may occur anywhere, but are commonest on the face and fingers. Of 50 consecutive cases of extra-genital chancre the sites were—lip, 29 (15 upper, 12 lower, 2 both lips); cheek, 3; nostril, 2; chin, 2; finger, 7; thumb, arm, shoulder, buttock, umbilicus, tongue, tonsil, 1 each. Kissing is the common cause of lip chancres, but in several instances glass-blowers have been infected by the use of a common blowpipe. Infection of the scalp in a barber's shop has been reported by Dr. Walmsley, and Mr. Eardley Holland had a case in an infant whose scalp was infected at birth. Lomholt has reported two similar cases in which forceps injury appears to have been the site of infection. In the buccal cavity, the tongue and the tonsil are most frequently involved. Finger chancres occur about the nails, and the infection is often the result of digital examination by medical men, dentists and midwives. The eyelid is occasionally the site of a chancre, the lesion being attended with much oedema. Vaccinal chancres are now practically unknown. The nipple may be the site of a primary sore, and also the anus.

Extra-genital chancres on the mucous surfaces are usually ulcerative, and the surface of the ulcer is often covered with a greyish membrane resembling that of diphtheria.

We have no reliable figures as to the relative frequency of extra-genital chancres, but estimate it at less than 5 per cent. Of 141 adult males in the London Hospital Clinic, extra-genital infection was known to have occurred in 3.3 per cent. Of 136 adult females, extra-genital infection was known to have occurred in 11 per cent. This proportion is too high, as many women do not show signs of syphilis till the tertiary stage. Finger gave the proportion in several European clinics as follows :—

	Genital	Extra-genital
Austria—		
Males	94	6
Females	86	14
Sweden	84	16
Balkan States	50	50
Czarist Russia—		
Government of Vladimir ..	9	91
" " Rjasan ..	26	74
" " Kursk ..	8	92

ESSENTIALS OF SYPHILOLOGY.—By Rudolph H. Kampmeier. Macmillan & Co., Ltd., London. Second edition, 1946. Page 97

Primary lesions of syphilis in most instances occur on or about the genitals. Some authors estimate that about 95 per cent of chancres are

found about the genitalia. Among the more than six thousand cases on record at the Vanderbilt University Hospital Syphilis Clinic, there were 463 patients with chancre. Of these primary lesions, including those already accompanied by secondary lesions, 25 appeared at sites other than the genitalia. Thus in our cases the incidence of extra-genital chancres was 5.5 per cent. The distribution of extra-genital lesions is shown below :—

	MALES		FEMALES	
	White	Negro	White	Negro
Lip ..	5	3	3	2
Tonsil ..	..	..	1	1
Tongue ..	1	..	..	..
Mouth ..	..	..	1	..
Nose ..	..	..	1	..
Breast ..	..	..	1	..
Wrist ..	..	..	1	..
Finger ..	..	1	1	..
Abdomen ..	2	..	..	..
Groin ..	..	1	..	..
	8	5	9	3

EDITOR, I.M.G.]

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL B. N. KHAN, Chief Health Officer, Delhi, is appointed to officiate as Director of Health Services, Delhi, with effect from the afternoon of the 14th August, 1947, *vice* Lieutenant-Colonel D. MacD. Fraser.

Major V. Sivasankaran, Medical Adviser (Pension) (D.A.D.M.S.), Ministry of Defence (Pensions Branch), is appointed Medical Adviser (Pensions) (A.D.M.S.), *vice* Lieutenant-Colonel E. C. Hicks vacated, 23rd August, 1947.

The undermentioned officer of the I.M.S. (E.C.) reverts from the I.A.M.C. and is seconded for service in the Royal Indian Air Force :—

Captain Rama Krishna. Dated 13th March, 1947.

The undermentioned officer has reverted to emergency cadre of I.M.S. on termination of service with the R.I.A.F.

ROYAL INDIAN AIR FORCE (MEDICAL BRANCH)

Flt.-Lieutenant B. S. Khangura. Dated 22nd March, 1947.

LEAVE

Major T. Sommerville, lately Assistant Director, Central Research Institute, Kasauli, is granted combined leave for 2 years and 4 months pending retirement with effect from 16th August, 1947.

PROMOTIONS

Colonel S. S. Sokhey is granted local rank of Major-General whilst holding the appointment of Director, Haffkine Institute, Bombay.

Lieutenant-Colonels to be Colonels

H. M. Strickland. Dated 6th June, 1947.

Sir S. S. Sokhey. Dated 15th December, 1944.

Majors to be Lieutenant-Colonels

6th April, 1946

A. M. Chaudhuri, O.B.E.	J. H. Gorman.
W. Happer.	W. McAdam, O.B.E.
H. T. McWilliams.	M. H. Shah.
H. J. Curran.	G. F. Condon.
M. R. Lappin, O.B.E.	H. S. Smithwick.
B. J. Griffiths.	B. S. Sandhu.

I. Bakhsh. Dated 8th April, 1946.
 R. T. Hicks, O.B.E. Dated 22nd April, 1946.
 A. M. Sheridan. Dated 29th April, 1946.
 K. Jilani. Dated 26th July, 1946.
 F. H. A. L. Davidson. Dated 4th August, 1946.
 D. H. Waldron, O.B.E. Dated 6th August, 1946.
 C. H. Dhala. Dated 8th August, 1946.
 S. Narain. Dated 25th August, 1946.
 F. M. Khan. Dated 3rd October, 1946.
 D. Datt. Dated 10th October, 1946.
 B. L. Taneja. Dated 19th November, 1946.
 W. J. Moody. Dated 6th December, 1946.
 H. D. R. Zscherpel, M.B.E. Dated 15th January, 1947.
 Min Sein. Dated 26th January, 1947.
 A. E. Kingston, O.B.E. Dated 1st February, 1947.
 A. B. Guild. Dated 4th February, 1947.
 J. R. Dogra. Dated 25th February, 1947.
 S. P. Bhatia, O.B.E. Dated 12th April, 1947.

6th May, 1947

R. C. Dracup.	V. Srinivasan.
M. R. Sinclair, O.B.E.	S. M. Kharegat.

M. C. Saincher.

D. R. Nath. Dated 21st May, 1947.

RETIREMENTS

Colonel V. N. Agate. Dated 1st June, 1947:
 Lieutenant-Colonel D. Sanyal. Dated 10th May, 1947.

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS
 Lieutenant-Colonel P. M. Antia. Dated 10th April, 1947.

RELINQUISHMENTS

Lieutenant-Colonel E. C. Hicks, Medical Adviser (Pension) (A.D.M.S.), Defence Department (Pensions Branch), relinquished the appointment, 23rd August, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Lieutenant-Colonel :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS
 Major C. V. Ram Chandani. Dated 26th November, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Lieutenant-Colonel :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS
 (Emergency Commissions)

Ty. Lieutenant-Colonel Hari Devvarma. Dated 27th December, 1946.

Ty. Lieutenant-Colonel Aylore Narayana Subbaraman. Dated 28th May, 1947.

Lieutenant-Colonel Brahma Prasad Sur. Dated 28th June, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services are replaced at the disposal of the Government of Bengal with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS
 (Emergency Commission)

Ty. Major Sibdas Hazra. Dated 6th July, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Major. His services have been replaced at the disposal of G. I. P. Ry. from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS
 (Emergency Commission)

Colin Henry Hope Robertson. Dated 19th July, 1946.
 The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS
 (Emergency Commissions)

Major Narendra Nath Dutt. Dated 1st February, 1946.

Ty. Major Turu Vekere Dharamay Yavenkata Krishnan. Dated 13th August, 1946.

Major Panthalingal Krishna Menon. Dated 7th October, 1946.

Ty. Major Profulla Chandra Sen. Dated 22nd October, 1946.

Ty. Major Kaivar Raghavendra Rama Rao. Dated 17th March, 1947.

Major Bishan Chand Bhalla. Dated 28th March, 1947.

Ty. Major Mohammad Ikram. Dated 7th April, 1947.

Ty. Major Thottungal Krishnan Rithu Parman. Dated 26th April, 1947.

Ty. Major Andrew Kenneth Sear. Dated 30th May, 1947.

Major Manohar Nath Hukku. Dated 19th June, 1947.

Ty. Major Veriam Singh Bhattal. Dated 24th June, 1947.

Ty. Major Puliur Krishnaswami Duraiswami. Dated 26th June, 1947.

Ty. Major Abdul Aziz Malik. Dated 26th June, 1947.

Major Nandkishore Ganesh Gadekar. Dated 26th June, 1947.

Major Vadarangam Swaminada Mahadevan. Dated 12th July, 1947.

Major Rustam Cavashah Dorabji Tarapore. Dated 19th July, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS
 (Emergency Commissions)

Major Sardari Lal Bhandari. Dated 26th September, 1946.

Major Dhanjishaw Fardunji Mehta. Dated 7th November, 1946.

Ty. Major Pandharangamo Gopalrao Gollerkeri. Dated 8th November, 1946.

Ty. Major Gajanan Dattatray Joglekar. Dated 30th November, 1946.

Major Bhabanidas Bhattacharyya. Dated 2nd December, 1946.

Ty. Major Walter Eugene Owens. Dated 6th December, 1946.

Ty. Major Gopendra Nath Mukherjee. Dated 5th February, 1947.

Major Chandulal Shirolal Tamboli. Dated 5th April, 1947.

Ty. Major Sibabrata Chatterjee. Dated 4th May, 1947.

Ty. Major Sudhansu Kumar Ray. Dated 15th June, 1947.

Major Mahadev Dattatraya Joshi. Dated 5th July, 1947.

Major Balwant Sadashiv Patankar. Dated 5th July, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Ty. Major C. T. V. Hemchandran. Dated 28th May, 1947.

Major E. J. Cullen, Medical Adviser (D.A.D.M.S.), Ministry of Defence (Pensions Branch), relinquished the appointment. Dated 25th August, 1947.

The undermentioned officer is permitted to relinquish his commission on reversion to the Indian State Forces :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain Vasant Vinayak Joshi. Dated 13th February, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of United Provinces with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain A. R. Faruqi. Dated 20th March, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of Punjab with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain Man Mohan Singh. Dated 19th April, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services have been placed at the disposal of the Government of Mysore with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain A. S. Venkatachalam. Dated 27th May, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of C.P. and Berar with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain M. G. Pendharkar. Dated 9th June, 1946.

The undermentioned officer is permitted to relinquish his commission on transfer to the Royal Army Medical Corps (Regular Army Short Service Commission) with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain G. T. Wallace. Dated 4th April, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captain Radha Syam Saha. Dated 26th April, 1946.

Captain Narayan Sheshgiri Gaitonde. Dated 29th May, 1946.

Captain Harendra Bahadur Sinha. Dated 25th June, 1946.

Captain Ram Krishna Mendireth. Dated 19th November, 1946.

Captain Mohammad Mamtaz-ur Rahman. Dated 12th December, 1946.

Captain Nallepilly Ranganatha Ramkrishnan. Dated 26th January, 1947.

Captain Kala Chand Saha. Dated 3rd February, 1947.

Captain Bhupati Ranjan Mukhopadhyay. Dated 6th April, 1947.

Captain (Mrs.) Elizabeth Mary Pilvang. Dated 20th April, 1947.

Captain Dev Rai Aggarwal. Dated 20th April, 1947.

Captain Syed Abid Ali. Dated 28th April, 1947.

Captain Dalip Kumar Roy Choudhury. Dated 29th April, 1947.

Captain Kamakhya Prasad Mitra. Dated 6th May, 1947.

Captain Sudhir Kumar Nandy. Dated 7th May, 1947.

Captain Azizur Rahman Chowdhury. Dated 14th May, 1947.

Captain Mihir Kumar Mitra. Dated 4th June, 1947.

Captain Kumud Chandra Dhar. Dated 12th June, 1947.

Captain Cottur Muthuswamy Chandrasekaran. Dated 15th June, 1947.

Captain Turuvekere Lakshmiramanaiah Rama Krishna Rao. Dated 20th June, 1947.

Captain Akepati Sivarama Reddy. Dated 22nd June, 1947.

Captain Chalavadi Vankateswarlu. Dated 24th June, 1947.

Captain Shamsheer Bahadur Singh Bawa Bhalla. Dated 26th June, 1947.

Captain Burjore Edulji Pardiwalla. Dated 26th June, 1947.

Captain Amalendu Sen Gupta. Dated 26th June, 1947.

Captain Sant Singh Hamal. Dated 26th June, 1947.

Captain Harbans Singh Jawandra. Dated 4th July, 1947.

Captain Jagadish Chandar. Dated 5th July, 1947.

Captain Brij Nath Bhargava. Dated 6th July, 1947.

Captain Ankes Kumar Chakrabarti. Dated 8th July, 1947.

Captain Altaf Mahmood. Dated 14th July, 1947.

Captain Pathpalli Sarvothamyya. Dated 19th July, 1947.

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

(WOMEN'S BRANCH)

Captain (Miss) Lakshmiraju Suryakantham. Dated 27th May, 1946.

Captain (Miss) Tehmina Namdar Irani. Dated 9th July, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captain Pandurao Motilal Desai. Dated 26th May, 1946.

Captain Yash Deva Wahie. Dated 27th July, 1946.

Captain Obadiah David. Dated 29th October, 1946.

Captain Karkal Ananthram Shetty. Dated 10th December, 1946.

Captain Budihal Raghavendrachar. Dated 21st March, 1947.

Captain Indu Bhusan. Dated 13th August, 1947.

Captain Murari Mohan Som. Dated 16th August, 1947.

Captain Rabindra Nath Sil. Dated 20th August, 1947.

Captain Durga Das Guha Thakurta. Dated 22nd August, 1947.

(WITHIN INDIAN LIMITS)

Captain Mahmud Khan Tukhi. Dated 27th November, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain Gagan Chand Ray. Dated 9th June, 1946.

Captain Haran Krishna Mallick. Dated 8th September, 1946.

Captain Janardan Kashinath Gharpure. Dated 24th October, 1946.

Captain Quazi Abul Khair Mohd. Abdul Khaleque. Dated 25th April, 1947.

Captain Carlyle Wilfred Russell D'Rozario. Dated 1st July, 1947.

Captain Shaikat Ali Syed. Dated 6th July, 1946.

Captain Prabhas Chandra Bose. Dated 16th October, 1946.

Captain Gouranga Lal Banerjee. Dated 21st December, 1946.

Captain Shankar Anant Ajgaonkar. Dated 8th January, 1947.

Captain Baji Gnaneshwar Rao. Dated 4th June, 1947.

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

(WOMEN'S BRANCH)

Captain (Mrs.) Elizabeth Mary Pilvang (*nee* Hugill). Dated 20th April, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain Tonda Dayanand Saraswat. Dated 25th July, 1946.

Captain Mani Mohan Bhattacharyya. Dated 27th October, 1946.

Captain Bimal Bikash Biswas. Dated 30th October, 1946.

Captain Rabindra Nath Sen. Dated 30th November, 1946.

Captain William Samuel Raju. Dated 10th December, 1946.

Captain Aricarevula Nageswara Rao. Dated 14th January, 1947.

Captain Apurba Kumar Ghosh. Dated 18th April, 1947.

Captain Dibakar Kundu. Dated 24th April, 1947.

Captain Durga Charan Bhar. Dated 29th April, 1947.

Captain Chittaranjan Ray. Dated 6th May, 1947.

Captain Satya Bhushan Dutta. Dated 12th May, 1947.

Captain Haradhan Chatterjee. Dated 18th May, 1947.

Captain Satya Saran Chatterjee. Dated 3rd June, 1947.

Captain Narendra Sanmukhlal Shroff. Dated 3rd June, 1947.

Captain Kochat Purushothaman. Dated 18th June, 1947.

Captain Jagannath Hari Joshi. Dated 21st June, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Surgeon-Lieutenant :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain Keshav Shamrao Dharadhar. Dated 14th March, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Flight-Lieutenant :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain Kuruvilla Kurian. Dated 13th August, 1946.
Captain S. P. Chatterjee. Dated 19th September, 1946.

Flight-Lieutenant Hardial Singh Gill. Dated 8th May, 1947.

Captain Oyitti Manakadan Satyendran. Dated 16th May, 1947.

Flight-Lieutenant V. B. Tawdey. Dated 26th June, 1947.

Flight-Lieutenant Srinivasa Rao Kidiyoor. Dated 12th July, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Squadron Leader :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Major M. U. Hyat. Dated 13th April, 1947.
Ty. Major Maddimsetti Venkataswamy Naidu. Dated 26th June, 1947.

Major (Ex-Squadron Leader) A. K. Basu. Dated 15th July, 1947.

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Original Articles

PLASTIC SURGERY IN GENERAL PRACTICE

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PLASTIC surgery is known to have been practised in the ancient times of the Vedas but its development as a highly specialized branch of surgery began since the Great War of 1914-18 which is comparatively a recent affair. Plastic surgery demands the highest degree of skill, accuracy of judgment and unlimited patience and is naturally a specialist's job but surgeons in general practice should not give up this branch of surgery altogether as so often a specialist is not available until it is too late. With the modern advancement, many an operation has become safe to the patient and with reasonable care one can give satisfactory relief to those who are physically, mentally and morally maimed. Some commoner conditions requiring such reparative surgery are mentioned here.

BURNS AND CONTRACTURES

This forms the largest group of cases that require attention.

In all extensive burns, the denuded area as soon as it becomes fit should be covered with epidermis graft (Thiersch). This is necessary not only for the economy of suffering but for shortening the period of septic absorption, loss of fluid, chronic suppuration and lardaceous disease. It also prevents the subsequent contracture that might follow. As a matter of fact it is a reproach to surgery to allow hideous contractures after a burn. Where the burnt surface is comparatively extensive, one may have to resort to pinch graft (Riverdin's whole thickness graft) and cover the area in regular rows by these little islets of whole thickness of the skin. The cosmetic result following this is very poor due to the spotted appearance of the grafted area and is, therefore, better avoided in exposed areas, specially in the face. The merit of Thiersch graft lies in its high percentage of success in 'take' but the area grafted becomes darker in hue and shrinking of the epithelium cannot be prevented if there is deeper tissue damage.

In cases of burns where contracture has already been allowed to form, the repair has to be done in many stages and various combinations of techniques have to be undertaken. This taxes the ingenuity of the surgeon and the tolerance of the patient to the utmost limit. The actual process of the operation will vary according to the site and manner of tissue destruction and resulting deformity.

The following are some of the essential points in plastic repair :

1. Accurate assessment of loss of tissue. This is very difficult and requires the help of an artist and models. Unless the surgeon has an accurate idea of tissue loss, he may land himself in the awkward position of producing further deformity instead of removing it.

2. Substitution should be accurate and with tissues morphologically as similar as possible. Thus where whole skin is lost, a graft of the whole skin would naturally give the best result. Similarly, if the area involved is lined with mucosa, the graft should possess the same lining. If this is not possible, it must at least have a lining of the skin epithelium.

Where supporting bony tissue is lost, the graft should contain bone or similar structure such as cartilage to make good the loss. The more uniform the substitution, the better the cosmetic result.

3. Restoration of function may be as important or even more important than the cosmetic appearance.

As in many of these cases the graft has to be taken from a distance, tube pedicle graft in several stages gives the best possible result. As a matter of fact Gilles' tubing of the graft has revolutionized this branch of surgery. By virtue of its continuity of blood supply which is never cut off, 'take' of such a graft is assured. Being made of skin and subcutaneous tissue there is no subsequent contracture and the texture is supple. Bone or cartilage graft can be incorporated within it. It can be shaped to restore the defect in nose, skin, ear, etc. Where the defect can be covered by mobilization of neighbouring skin, pedicle flap also gives very good result, as is so often done in facial defects.

WOUNDS AND DEFORMITIES

Accidental avulsion of skin and subcutaneous tissue is quite common in street and industrial accidents. The earlier the area is grafted consistent with safety, the better is the prognosis (figures 1 and 2, see plate XXIV).

In many recent wounds, specially in the face, every attempt should be made after primary excision to appose the wound margin as far as possible without tension. At the same time no deliberate plastic flaps and repair should be attempted at this stage. Mucosa should never be removed when the wound is kept open. In such cases the mucosa should be sutured with the skin margin. This often results in very little deformity, the final repair becomes easier and success more assured (figures 3 and 4, see plate XXIV).

CANCERUM ORIS

This forms the next common group of cases causing extensive destruction of facial tissues with ugly deformities. The gangrene is usually seen in the later part of enteric fever and also in kala-azar.

In the early stages actual destruction may be minimized with energetic oral hygiene, removal

of dead tissues and adequate drainage together with combating the infection.

Cases with deformities require careful planning and repair (figures 5, 6, 7 and 8, see plate XXIV).

As so often there is associated loss of bony support, one has to consider the repair of such defect with osseous or cartilaginous graft or dental prosthesis depending on which will give the better functional result (figures 9, 10, 11, 12, 13 and 14, see plate XXIV).

MALIGNANT GROWTH

Removal of a superficial carcinomatous ulcer or chronic ulcer (varicose) may leave behind large denuded areas. The covering of such an area by a graft may save the patient from an unnecessary amputation. One of the nurses of a hospital was admitted with huge ulcer 6 inches \times 10 inches on the back, lower half of which was adherent to the dorsum ileum. This was the result of intensive 'Chaul' therapy for an epithelioma developed on an unstable scar following burn. She was having agonizing pain in the scar and a continuous discharge from it. After complete excision of the ulcer including a shaving of bone and several attempts at mobilizing the flaps, ultimately in two months' time, the whole area became completely covered with flaps. But in the meanwhile she developed metastasis in the abdominal lymph glands and liver and rapidly became anæmic and died. Four days before her death she complimented me on curing what she had come to me for.

HARE-LIP AND CLEFT PALATE

By themselves, they form a very large group of cases for plastic surgeons.

Although the repair of hare-lip can be undertaken a few days after birth, generally it is not done till the second or third month of infancy when the child is sufficiently acclimatized to independent existence and the tissues are easier to handle.

In repairing hare-lip, the depth of the lip, symmetry of the alæ and vermillion border should be carefully restored to evenness. In doing this it is better not to spend unnecessary time at the first occasion since secondary correction is often needed, which personally I prefer to leave deliberately for another occasion (figures 15 and 16, see plate XXIV).

In double hare-lip with projected pre-maxilla, resetting should always be done some weeks before the repair of the lip. On no account should the pre-maxilla be excised (figures 17, 18, 19, 20, 21, 22 and 23, see plate XXIV).

The best time to operate with safety on cleft palate is between two and two-half years of age. There is, however, no age-limit for the repair of hare-lip, but when the operation for cleft palate is undertaken amongst the higher age groups the cleft can often be closed. In such cases phonetic

defect persists so that grown-up patients should be forewarned about this defect.

There are many other instances where either for kinetic reason or for cosmetic only, plastic repair is indicated. Deformity of nose, ear, eye, ptosis or hypertrophied breast, all require a specialist's knowledge and skill and should only be undertaken where success can be assured.

No attempt has been made here to describe the various operations or their pros and cons. It is rather with a view to increasing the interest in this branch of surgery that this has been written.

Descriptions of Illustrations

Figure 1. There is total loss of skin, platysma from below the chin to the chest, child cannot close the mouth and there is continuous dribbling of saliva. Near the right elbow, part of the pedicle prepared can be seen.

Figure 2. After spreading the pedicle in the neck. The chin is completely free, mouth is closed normally. The upper part of the chest is partly covered with Thiersch graft, as the scar over the area is unstable and breakdown.

Figure 3. Street accident. The volar and medial aspect of lower third of arm and upper two-thirds of forearm completely denuded of skin, subcutaneous tissue and deep fasciae muscles exposed. The area shown has been covered by a tube graft. The margins have been touched off by the photographer.

Figure 4. Severe kookri cut over the face, completely severing the nose, part of the orbital rim, and the two lids. A primary suture of the nose, both mucosal and cartilaginous parts, skin in tiers of suture. Primary union occurred with quite satisfactory result. The sutural line can be seen in the picture.

Figure 5. Destruction of whole thickness of cheek, the scar adherent to zygoma with salivary fistula, following enteric fever.

Figure 6. After repair mucosa mobilized and sutured together; skin and muscle flap raised from outer and lower aspect and mobilized to cover the mucosal flaps.

Figure 7. Same case showing defect over the mandible with salivary fistula.

Figure 8. After repair. While convalescing, he developed smallpox, marks of which can be seen on arm and leg but none the worse for it.

Figure 9. Post-typhoid cancerum oris with loss of two-thirds of upper lip, part of the cheek and angle of the mouth, also columella and floor of the left nostril.

Figure 10. After repair. A descending flap in the right side and an ascending flap on the left side, the lip is constructed, vermillion border was borrowed from oral mucosa of lower lip.

The patient had enteric like relapses twice and the wound broke away though partly, i.e. microstomia on the left side and absence of gingolabial sulcus.

Figure 11. Cancrum oris with loss of cheek and angle of mouth.

Figure 12. Angle of the mouth repaired and cheek gap filled up by mobilized flap of ascending type.

Figure 13. Cancrum oris in kala-azar, whole of the chin and lower lip, and ramus of both mandible from premolar to premolar lost.

Figure 14. A double-lined flap with pedicle raised from the upper part of the chest swung over to form the chin and lip. Remnants of vermillion border at the either angle of the mouth mobilized and sewn over the chin flap. Later a cartilage graft inserted to reconstruct the osseous support to the chin; angulation in the lower lip, junction of two mobilized part further improved.

Figure 15. Hare-lip.

Figure 16. After repair. Symmetry of nose and depth of the lip obtained.

Figure 17. Bilateral hare-up and pre-maxilla, completely free and projecting as a snout.

Figure 18. Lateral view.

Figure 19. After repair. Preliminary setting of the pre-maxilla. In later stage repair of the lip being done.

Figures 20 and 21. Syphilitic perforation palate (congenital).

After repair. These cases are difficult to mend due to extensive scarring that accompanies the lesion.

Functional result (phonetic) is poor due to contracted and rigid soft palate, velo-pharyngeal closure is imperfect.

Figures 22 and 23. Hare-lip in a young man. This young man submitted himself for operation after rejection by a girl. On the fourth day of operation after removal of stitches he suddenly left the ward.

Couple of days after he presented me with his final picture and informed me with a grin that the marriage had taken place.

PLASTIC REPAIR OF CONTRACTURES AND LATE TREATMENT OF BURN-SCARS

A REPORT OF 12 CASES

By MURARIMOHAN MUKHERJI

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RECENT improvements in treatment of burns will certainly lower the incidence of bad scars with contractures. Bad scars causing symptoms or loss of function of a part of the body are really very few. In 1947, 91 cases of major burns were treated in the Campbell Hospital but only two cases developed contractures, one in the axilla and one in the fingers and both left the hospital before treatment was complete. All the

same contractures will form in some cases due either to wrong treatment or to want of facilities for proper treatment.

Twelve cases were treated by me in the Campbell Hospital in 1946, all of whom were healthy except for the contractures. Grouped regionally there were 4 cases of contractures of the axilla (holding the arm to chest wall), three of the fingers (in flexion and in extension), three of the elbow, and two of the ankle.

Qualities of scar

1. All these cases had fairly old scars, caused by burns, ranging from 2 to 24 years.

2. All the scars were mobile excepting two which were fixed to the superficial muscles, but none to the bone.

3. Ten cases had soft scars and two cases had very hard scars with tendency to form keloids; one was in the axilla and one was in the ankle.

4. No scar was unstable, i.e. with formations of ulcers now and then.

Palliative treatment of contractures

Scars usually take 6 months to mature. The character of the scar and consequently the ultimate deformity can be modified by proper palliative treatment. Massage, physical therapy, careful deep x-ray therapy, and irradiation will make the scars mobile and soft.

Active exercise to stretch the scars will not only elongate and mobilize the scar but will also stretch the normal skin beyond it, helping in apposition of skin after excision of the scar. The boy shown in figure 8 (see plate XXV) had a scar holding the arm to the side of the chest. He was asked to try to abduct his arm as much as he could and to increase the range. He did the same 30 to 40 times a day. Though the range of abduction was not increased materially, yet the skin of the chest wall and back was sufficiently stretched and mobilized. And it was certainly easier to cover the raw area after the excision of the scar with 'Z' plastic sutures.

Active exercise of muscles and tendons may also prevent scars getting fixed to them, provided the damage to the muscles and tendons is not severe. This simple procedure is very helpful specially in cases of injuries of fingers.

Preliminary deep x-ray therapy or irradiation is advocated for all cases having a tendency to form keloids.

Anæsthesia

General anæsthesia with open ether or gas, oxygen and ether was used for all cases. Some surgeons advocate local anæsthesia for all plastic operations but I find it inconvenient. My arguments are as follows:—

1. Uncertainty in the final procedure of treating the contracture, a scar after removal may give rise to an unexpected gap and one may have to choose some other method besides the pre-meditated procedure to cover the gap, e.g. a flap

graft designed to cover the defect being insufficient, one may have to take some razor grafts.

2. In almost all cases, the patient has to be tackled in more than one part of the body.

3. The infiltration of local anæsthetic distends the tissues and this may cause loss of proper alignment.

4. The stretching of the surrounding skin for closing a gap, however much undermining might have been done, may cause some pain when local anæsthetics are used.

5. Last but not the least important is the greater chance of infection of the wounds with the local anæsthetics.

Preliminary preparations

All examinations and preparations necessary for an operation under general anæsthesia were done. Donor sites for skin grafting were examined carefully and were noted down. The affected area was cleaned, painted with triple dye and covered with sterile dressings 48 hours before the operation. The donor sites for skin were cleaned and kept covered with sterile dressings. As a rule one or both thighs or some other suitable donor sites for razor grafts were always kept ready besides the areas meant for pedicle or flap grafts.

Operation theatre staff were always instructed to keep ready things like Stent's dental composition, measuring scales and callipers, sponges, etc., razors and equipments for Thiersch's graft, sticking plaster, plaster of paris, aluminium plates, etc., for fixation of parts.

Some general principles of operation and after-treatment

1. All scar tissues were excised though sometimes soft mobile scars were utilized for covering less important areas.

2. Portions of skin having incessant movements over deeper structures, i.e. skin over the joints, tendons, neck, hand, etc., were best repaired with full thickness skin with some amount of subcutaneous fat, i.e. pedicle or flap grafts or 'Z' plastic suture. If the whole area could not be covered in this way, the next best procedure, that was found almost as effective, was to place one or more whole thickness skin grafts transversely to the main line of the scar, i.e. transversely to the main line of tension of the skin over the joints.

Example.—A boy was admitted with a very extensive scar on the neck bending the face and the chin. On the same side the chest wall was also scarred. A transverse bridged flap from left pectoral region was placed across the excised scar. The rest of the raw area was covered by Ollier Thiersch's grafts (figure 1, plate XXV).

3. The donor sites were selected according to the necessity, condition of the skin and convenience of the parts. The flaps were dissected and sutured in proper place very carefully so that there was no inversion of the skin edges and there was full contact of the inner surface of the flap with the base of the wound.

4. The lines of suture and the flaps had no tension. The amount of tension that might be overlooked in repair of ordinary wounds was carefully avoided in these plastic repairs, as destruction of even a part of a flap might spoil the whole operation.

Example.—A boy had the forequarter of the foot raw all round. The part was placed under a double pedicle bridged flap on the inner aspect of the thigh. There was a little tension and the result was destruction of the middle of the flap as shown by the white scar on the corium of the left foot (figure 2, plate XXV).

5. Proper fixation of the parts and the grafts for the required period. The Thiersch's grafts were best fixed with rubber sponge and sticking plaster for 8 to 10 days. The pedicle grafts or flap grafts were fixed with plaster of paris bandages for 3 weeks. These were not disturbed before the scheduled time unless there was any question of sepsis or impaired circulation.

6. The flap grafts were shaped along the lines of their main blood supply and were sized according to the accepted principles (length : breadth : : 1 : 1 except in some sites as face and neck). Narrow long grafts were first delayed for 3 weeks.

7. The Thiersch's grafts were always of medium thickness. The big sized ones were always snipped at some points after they were spread over the raw areas. This simple technique prevented lifting up of the flap by exudates underneath.

8. Sepsis was controlled by administration of sulfathiazole both locally and systemically. As a rule a short course of 3 days of sulfathiazole administration was carried out with very encouraging results. None of my cases were spoilt by infection.

9. *Sites of scars.*—The most difficult of my series were the four cases of contracture of axilla. These four cases were treated by four different methods.

No. I.—Md. Abdul Gani, Mohammedan male, 35 years, history of burns 17 years back. There was no trace of the axillary cleft and the upper part of the arm was incorporated in the chest wall as it were. Rotation movements of the axilla were present proving that the joint was free (figure 3, plate XXV).

Treatment.—The arm was separated by making incisions on the skin of chest wall and back in such a way that the soft scarred skin could cover the raw surface on the medial aspect of the arm. The pit of the axilla was covered by inlay skin grafting on a mould of Stent's dental composition with much difficulty. The rest of the area was covered with Thiersch's graft as usual. The end result was not perfect (figure 4, plate XXV). The patient raised the arm to about the horizontal level but with much difficulty. The axillary space was getting scarred under thin Thiersch's graft.

No. II.—Brindaban Santra, Hindu male, 45 years, history of burns 3 years back. A fold of

soft scar was holding the arm to the side of the chest wall like a web. Movement of shoulder present but limited except rotation which was normal.

Treatment.—He was treated by 3 test tube grafts or tunnel grafts with medium thickness skin. The photograph shows the grooved bases of those tunnels (figure 5, plate XXV).

No. III.—Marjina Khatoon, Mohammedan female, 10 years, history of burns 4 years back. The scar tissue was soft and mobile, holding three-quarters of the arm to the chest wall (figure 6, plate XXV).

Treatment.—Preliminary exercise of abducting the arm helped in stretching the normal skin. Arm was separated by an incision which ran through the centre of the fold. The raw surface of the arm was covered by the soft scar. The pit of the axilla was covered by suturing the anterior and posterior axillary folds which were advanced by V-Y advancement flaps. The remaining raw surface was covered by Thiersch's graft. Arm was fixed in abduction at right angles for a fortnight and then she was asked to abduct it forcibly to stretch the muscles. The result was very gratifying (figure 7, plate XXV) but the line suture being along the axillary borders may develop some recurrence of scar.

No. IV.—Taijas Ali, Mohammedan male, 10 years, history of burns 6 years back. A fold of scarred skin was holding almost whole of the arm to the side of the chest wall. The scar was soft and mobile (figure 8, plate XXV).

Treatment.—Preliminary treatment of stretching the skin was very helpful. Arm was separated by an incision placed near the chest wall and the raw surface of the arm was covered by the scarred skin. The pit of the axilla was repaired by 'Z' plastic flaps (figure 9, plate XXV). The remaining raw surface was covered by razor grafts.

Post-operative treatment.—Active exercise to stretch the muscles helped in full abduction. The suture line being transverse to the axillary fold and old scar never hampered in the movements of axilla.

10. *Contracture of elbow.*—These 3 cases were treated by *test tube grafts*.

Santi Devi, Hindu female, 16 years, history of burns 6 years back. The right elbow was held in flexion by a scar tissue. The scar tissue was soft and had some healthy skin fold near the joint surface.

Treatment.—Medium thickness razor grafts were wrapped round 3 short thick test tubes with raw surface outwards. The grafts were fixed to the test tube by stout silk thread. Three small separate incisions were made through the healthy skin beneath the scar and through and through tunnels were created deep to the scar. Then 3 test tubes with grafts on them were introduced through the tunnels. The tubes were kept in position by tying the silk

threads over the scar covered with some dressings (figure 10, plate XXV). The elbow was fixed in plaster of paris cast for 10 days after which the tunnels made by the skin grafts were opened. The elbow could be fully extended as soon as these tunnels were opened (figure 11, plate XXV).

11. *Contracture of fingers.*—Two cases had contractures in flexion. They were treated by excision of scar, extension of the fingers with Brockman's pins and wire frames and application of medium thickness skin grafts kept in place by a mould of Stent's dental composition. The dressings were removed in 10 days' time but the extensions were kept for a fortnight. The results were fairly good, though after a few months the fingers became slightly stiff.

The third case had contracture in extension. This was a Hindu male, aged 26 years, with history of burns of right hand 17 years ago (figure 12, plate XXV). The skin of the dorsum of the hand was fashioned in such a way that the raw surfaces of the fingers could be covered by it. Then the raw area on the dorsum of the hand was placed under a bridged flap on the abdominal wall for 3 weeks. The connections were incised after this period and the wounds were closed. Considering the nature of contracture and its age (17 years old) the result seemed fairly good and it was certainly better than razor grafts on these tendons on the dorsum of the hand (figure 13, plate XXV).

12. *Contractures of ankle.*—One case had a thin mobile scar on the front of the ankle. The patient was a Hindu male, age 10 years, with a history of burns two years ago. The foot was held up in dorsiflexion. He was treated by test tube graft (figure 14, plate XXV).

The other case had a hard and slightly fixed scar. This was a Hindu female, aged 8 years, with a history of burns two years ago (figure 15, plate XXV). Treatment was by excision of the scar and by pedicle grafting in two transverse areas, one across the front of the ankle and one across the base of the big toe (figure 16, plate XXV). The rest of the area was covered with Thiersch's graft. The flap was taken from the back of the other leg. The result was fairly good (figure 17, plate XXV) though new formation of hard tissue might develop into a keloid. As a precautionary measure a course of deep x-ray was given.

Summary

(a) Twelve cases of contracture after burns were treated by different plastic operations with fairly good results.

(b) Pedicle grafts, 'Z' plastic sutures and 'V-Y' advancement flaps gave better results over the joints than the razor grafts.

(c) Preliminary treatment of scars helped in plastic repair.

(d) General anæsthetic was found to be more suitable than local in all cases.

(e) Incidence of infection was nil as sulfa-thiazole was used for a preventive course.

(f) Scars with a tendency to form keloids were better treated with whole thickness skin grafts.

I wish to convey my sincerest thanks to Dr. H. Rahman, additional teacher of Clinical Surgery, and his staff for the co-operation I always received from them. I am grateful to Major E. H. Lossing, Superintendent, Campbell Hospital, for allowing me to publish the records of these cases.

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UNUSUAL TYPES OF FOREIGN BODIES IN THE GASTRO-INTESTINAL TRACT

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FOREIGN BODIES of various types in the gastro-intestinal tract have been reported. Textbooks on surgery commonly mention hair balls in stomach as a common example of foreign bodies among hysterical women. Clayton-Mitchell (1945) reported such a case in an African woman. Accidents among jugglers failing to get out what they had swallowed also are reported in literature. One such case was reported by de Soldenhoff (1937). Accidental swallowing of coins and lead pieces have been reported by Kini (1946). The psychological factors leading to swallowing of foreign bodies among soldiers have been discussed by Neustatter (1947) and Hallett (1947).

In recent times due to food shortage eating of dried fruits as substitutes has led to the causation of intestinal obstruction. Elliot (1932) reviewed 36 cases of foreign bodies causing obstruction during the previous 22 years. Jones and Davis (1945), Lyall (1945), Radclyffe (1945) and Ryan and Nagle (1945) have reported cases of ingested dried fruits causing intestinal obstruction.

Two cases are now reported of which one is interesting because a hysterical girl thought that she could commit suicide by swallowing broken bits of valet razor blades and glass bangles. The other case was an accidental swallowing of a broken bit of sewing needle and shows its progress in the gastro-intestinal tract without much damage to it.

Case 1.—A young hysterical girl, aged 20 years, while being examined for her general ailment in April 1946 asked by way of information whether swallowing of razor blades and broken bits of glass bangles would cause death. When questioned as to why she wanted this information she jokingly said that she had swallowed razor blades and broken bits of glass bangles. This information was not discredited knowing the mental make-up of the girl. A careful examination was made for any injury that might occur to the pharynx, gullet and gastro-intestinal tract. No sign of injury was detected on clinical examination and there was no evidence of colic, pain or tenderness in the abdomen. The possibility of her having swallowed the objects was still kept in mind and she was kept under strict observation with directions to the nurse to send information at once if any colic or pain was complained of.

The patient refused to take any food but drank copious draughts of water and she was given 4 oz. of Kaylenol at about 6 p.m., i.e. about 4 hours after the suspected swallowing of the blades. Eighteen hours afterwards an x-ray taken on mere suspicion, not on clinical evidence, showed broken bits of valet razor blades and broken bits of glass bangles in the large bowels. They had passed through the pylorus and the ileo-cæcal valve. In 48 hours all that she had swallowed passed out without any ill effects to the gastro-intestinal tract. It was difficult to imagine how she could have swallowed razor blades and broken sharp bits of glass bangles and also a pin without injuring her pharynx, œsophagus and the gastro-intestinal tract.

On careful enquiry the patient seems to have confessed later to her friend that she had swallowed the razor blades and bits of glass bangles by sandwiching them between slices of bread. It is interesting to observe that the glass bits and the razor blades passed through the gastro-intestinal canal without causing any injury to the mucous membrane or the walls especially while passing through the narrow channels in the pyloric and ileo-cæcal regions. There was no damage done to the anal orifice either when these bits with the sharp edges and ends were passed.

As she refused to take any food after swallowing the bits it is quite possible that she might have taken considerable quantity of bread while swallowing the foreign bodies. Ultimately these bits left the small intestine and got mixed up with the faecal matter already formed in the large intestine. The administration of Kaylenol helped in causing easy movement of the bits without any damage.

Case 2.—This case illustrates the course of an accidental swallowing of a broken bit of a sewing needle.

A Hindu girl, aged 15 years, was admitted for colic and bleeding per rectum with a history of having swallowed accidentally the broken bit of

a sewing needle which she had held between the teeth. This happened on 6th August, 1946, at 5 p.m. She ate some plantains, buns and rice at 7 p.m. On 7th August, 1946, at 7 a.m. she took castor oil about 1½ ounces. She had pain in the abdomen during defaecation and the same night passed bright red blood per rectum and developed colic. On 8th August, 1946, the third day of the accident, in the morning she again passed bright red blood per rectum for which she sought admission into the hospital at 10.30 a.m.

A plain x-ray was taken which showed the needle in the ascending colon with the sharp point directed upwards along the normal course of the current in the large bowel. In order to make certain that it remained in the bowel and not migrated into tissues and also to mix up and dislodge the needle with some heavy material, a barium enema was ordered at 2.30 p.m. At 3 p.m. after evacuation of the enema, x-ray showed no needle but it was not found in the evacuation. At 3.30 p.m. a rectal examination was made and the needle was found stuck horizontally in the rectum and was removed with the finger.

These two cases are reported for the following reasons:—

1. In the first case no ill consequence occurred after the swallowing of the razor blades and the broken bits of glass bangles for suicidal purposes. No operative interference was necessary to remove them and no discomfort or inconvenience was caused at the time of swallowing them, during their course in the gastro-intestinal tract, and during and after evacuation.

2. The second case was accidental swallowing of a needle which broke into two when held between the teeth. Unfortunately the sharp end of the broken needle was in the direction of the current of the gastro-intestinal tract and must have got stuck in the ascending colon to cause bright red bleeding. The barium meal enema helped to dislodge the needle and send it down the canal. Finally, it had to be removed by the finger from the lower part of the rectum.

List of illustrations (see plate XXVI)

1. X-ray picture taken 18 hours after swallowing of the razor blades and the glass bangles. The major portion of the blades have passed the ileo-caecal valve shadows of which are seen.

Note the longitudinal shadow in the region of the rectum which is a pin shown in picture 3.

2. Photograph of the broken bits of glass bangles swallowed mounted in a glass bottle.

3. Photograph of the pin swallowed.

4. and 5. Photographs of the broken bits of valet razor blades swallowed.

6. X-ray picture taken 2 days after the swallowing.

7. X-ray of case no. 2 showing the broken sewing needle in the ascending colon.

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A STUDY OF WEIL-FELIX REACTION IN THE DIAGNOSIS OF TYPHUS FEVER IN BOMBAY*

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THE demonstration of causal rickettsia for early diagnosis of typhus fever is a time-consuming procedure and requires the use of a complicated technique as yolk-sac cultivation or inoculation of different laboratory animals. Serological tests such as the Weil-Felix reaction, complement fixation or rickettsial agglutination are much simpler to perform but the last two of these require specific rickettsial antigens; the preparation of these is not within the scope of an average small laboratory, so a laboratory worker has to continue to rely on the Weil-Felix reaction. Three serological varieties of *B. proteus* X, known as proteus X19, X2 and XK, are the only reagents by means of which the diagnosis of different varieties of typhus can be made.

As with many serological tests, the study of Weil-Felix reaction has brought to light certain anomalies and limitations that were not at first realized. Many workers have come to doubt its specificity on account of the reaction being positive during the course of other diseases. Factors such as standardization of technique, endemicity of infection, agglutinin level of local population, have to be reckoned with in the correct interpretation of this reaction. It is the purpose of this article to study the Weil-Felix reaction done on a large number of sera from pyrexial and apyrexial cases and to see how far some of

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the factors mentioned above interfere with the proper interpretation in the correct diagnosis of typhus fever.

Material and Method

To study the level of proteus OX agglutinins in the Bombay population, 500 sera sent for Wassermann test and 763 sera sent for Widal tests were tested for Weil-Felix reaction by the method described below. In testing sera for the Widal reaction, the combined method of clot culture and the Widal reaction (Soman, 1932, 1934) was used, so that 185 sera from bacteriologically proved typhoid and para-typhoid cases were available for study. Fresh alcoholic proteus suspensions were prepared from the three standard proteus strains every three months according to the method of Bridges (1944) and the Felix's (1944) technique was slightly modified. The tests were incubated at 50 to 52°C. instead of at 37°C. in the water-bath for four hours and kept overnight in the ice-chest for the final reading. Whenever a serum obtained from a pyrexial case showed a titre of 1:50 or 1:125 a repeat specimen was requested with a brief note on clinical history. Results of the Weil-Felix reaction on sera coming from pyrexial and apyrexial cases are summarized in tables I and II. Results of the same test on 185 samples of sera from typhoid and para-typhoid cases are summarized in table III, while the results obtained in 28 cases of clinically diagnosed typhus fever are shown in tables IV and V. Clinical history was available in 13 cases. In 9 cases of OX19 type, male guinea-pigs were inoculated intraperitoneally with 5 c.c. of patients' blood and in 3 cases of OXK type mice were similarly inoculated with 0.5 c.c. of blood.

TABLE I
Results of Weil-Felix reaction on 500
sera sent for WR

Titre of serum	SUSPENSIONS OF <i>B. proteus</i>		
	OX19	OX2	OXK
Below 25 ..	489	500	499
25 ..	7	0	0
50 ..	1	0	1
100 ..	3	0	0
200 ..	0	0	0
	500	500	500

It is known that sera from normal persons may contain low titre proteus OX agglutinins even in areas free from typhus infection. The results in table I showed only 3 sera out of 500 positive for proteus OX19 agglutinins in 1:100 dilution. Tables I and II, when considered together, showed that out of 1,263 sera examined, only 23 samples were positive in dilutions ranging from 1:50 to 1:125, giving a percentage

TABLE II
Results of Weil-Felix reaction on 763 sera from
febrile cases including typhus cases

Titre of serum	SUSPENSIONS OF <i>B. proteus</i>		
	OX19	OX2	OXK
Below 50 ..	714	759	759
50 ..	5	2	2
125 ..	6	2	1
250 ..	10	0	0
500 or over ..	28	0	1
	763	763	763

of 1.8; ten sera were positive in a dilution of 1:250 and 29 in a dilution of 1:500 or over. With the exclusion of those showing a titre of 1:250 or over, a very large number of sera was either negative or below a titre of 1:50. Weil (1920) in a series of 1,837 control sera from febrile and afebrile cases recorded only 1.2 per cent agglutinating the strain of proteus OX19 in 1:50 dilution; this titre according to Felix (1944) would have to be doubled to bring it on line with the results obtained by the use of alcoholic suspensions. A minimum diagnostic titre of 1:100 or 1:200 for typhus infection in non-endemic areas was suggested by many workers as MacKenzie (1941), McConn (1943) and Felix (1944). But Baker and others (1943), Brockbank and Whittaker (1944), Dyer (1944) and Dick (1946) did not feel justified in considering any titres below 1:480 as diagnostic of typhus infection. In the present series, as 98.2 per cent sera were found to be negative in a titre of 1:125, this titre could safely be taken as the minimum diagnostic titre for typhus infection in the presence of suggestive clinical history.

In order to study the problem of non-specific rise in Weil-Felix titres, 174 cases of typhoid and 11 of para-typhoid A infection were studied in relation to their Weil-Felix titres at different stages of disease.

TABLE III
Results of Weil-Felix reaction in 185 typhoid
and para-typhoid cases

Titre of serum	SUSPENSIONS OF <i>B. proteus</i>		
	OX19	OX2	OXK
Below 50 ..	183	184	184
50 ..	1	1	1
125 ..	0	0	0
250 ..	1	0	0
	185	185	185

Only one serum showed a titre of 1:250. This finding is of special interest in view of the confusing reference in the literature to the 'anamnesic rise in titre' due to non-specific infection and clearly showed that in the diagnosis of typhus infection, non-specific rise in titre due to enteric infection did not occur. Felix (1944), who investigated this possibility of non-specific rise in OX19 titres, observed for periods of several weeks typhoid, pneumonia and other febrile cases with and without history of previous typhus infection and concluded that even those patients who showed normal or residual agglutinins in titres ranging from 1:50 to 1:200 showed no re-stimulation of these agglutinins. The findings in the present series, therefore, appear to be in complete accord with those of Felix and are very significant because enteric fever figures so prominently in the differential diagnosis of typhus fever. A high residual OX19 titre may rarely lead to some difficulty in arriving at correct diagnosis necessitating repeat observations. Following is a case in point observed by the author:—

A sample of blood tested for Widal on the 17th day of illness showed typhoid O and H titres of 1:250 and Weil-Felix OX19 titre of 1:1,000. An enquiry into the clinical history of the case did not reveal any presence of rash or history of T.A.B. inoculation or previous typhus infection.

A repeat specimen later showed a rise in typhoid O and H titre of 1:500 with the Weil-Felix OX19 titre stationary. The clot culture was sterile twice. The subsequent rise in Widal titre, with the Weil-Felix titre unchanged, distinctly pointed to the true nature of infection which was subsequently confirmed by isolation of *B. typhosus* from the patients' stool.

The Weil-Felix titre in 28 cases of typhus infection was studied with many repeat observations. Serologically, 23 cases were of the OX19 type, 2 of OX2 type and 3 of OXK type.

The results of these cases fall into two groups. One group in which titres rose very high early above the diagnostic level (table IV) and the other in which they did not rise beyond 1:500 even during the third week of illness (table V). The possibility of such cases with low-titre reactions had to be kept in mind otherwise they were likely to be missed or wrongly interpreted. Frequent repeat observations to demonstrate rise in titre or the causal virus was the only method of arriving at correct diagnosis. Clinical history was available in 13 out of 28 cases. The infection was of a mild nature and showed many clinical features in common. The pyrexia was of a remittent or intermittent type lasting from 14 to 16 days, terminating by lysis within 2 to 3 days. Slow pulse, persistent headache and moderate leukocytosis were prominent features.

TABLE IV

Results of Weil-Felix reaction in 12 cases of typhus showing low titre

Serial number	Widal number	Widal titre	WEIL-FELIX TITRE			Day of fever	Result of animal inoculation
			OX19	OX2	OXK		
I	319	125 (para B)	2,500	..	..	13	N.D.
	366	125 (")	2,500	..	..	29	
II	337	Negative	1,000	250	..	13	Negative.
	370	"	125	50	..	20	
III	529	50 (TYH)	125	..	..	5	Febrile reaction.
		125 (para B)					Neill-Mooser reaction.
	560	125 (TYO)	500	..	..	6	R. mooseri +.
		125 (para B)					
IV	589	125 (TYO)	2,500	250	..	12	
		125 (para B)					
V	553	Negative	2,500	..	..	15	N.D.
	598	"	1,250	..	..	24	
VI	596	"	250	..	..	8	Febrile reaction.
	619	"	1,250	..	..	13	
VII	687	"	125	..	..	14	N.D.
	699	"	1,250	..	..	18	
VIII	390	"	1,250	125	..	14	N.D.
	433	"	2,500	125	125	23	N.D.
IX	462	"	1,250	125	..	12	N.D.
	583	"	1,250	..	..	13	N.D.
X	613	"	1,250	..	..	7	N.D.
	616	"	1,250	..	..	7	Febrile reaction.
XII	1426	"	..	250	..	12	Negative.
	1427	"	..	500	..	14	
XIII	1494	"	..	500	..	32	
	1193	"	..	..	500	13	R. orientalis +.
XIV	1211	"	..	..	1,250	14	
	1241	"	..	..	500	22	

N.D. = Animal inoculation not done.

TABLE V
Results of Weil-Felix reaction in 14 cases of typhus showing low titre

Serial number	Widal number	Widal titre	WEIL-FELIX TITRE			Day of fever	Result of animal inoculation
			OX19	OX2	OXK		
I	378	Negative	50	50	..	7	Negative.
	450	"	250	125	..	14	
II	451	"	50	..	..	10	Febrile reaction.
	499	"	500	..	..	21	Neill-Mooser reaction. <i>R. mooseri</i> +.
III	624	"	250	..	..	12	N.D.
	639	50 (para B)	500	..	..	14	
	701	125 (para B)	500	..	..	21	
IV	631	Negative	125	..	..	5	Febrile reaction.
	648	"	500	..	..	10	
V	635	"	Negative	..	..	10	N.D.
	688	"	500	250	..	17	
	698	"	250	125	..	20	
	724	"	250	125	..	27	
VI	677	"	125	..	..	8	N.D.
	700	"	500	..	..	13	
	742	"	125	..	..	20	
VII	909	125 (para B)	500	125	..	12	N.D.
	934	50 (para B)	500	50	..	20	
VIII	351	Negative	500	..	..	12	N.D.
IX	449	"	500	50	..	12	Febrile reaction.
X	315	"	500	..	..	13	N.D.
XI	752	"	500	125	..	19	N.D.
XII	1555	"	..	250	..	..	N.D.
XIII	1287	"	..	..	125	16	<i>R. orientalis</i> +.
XIV	1325	"	..	..	500	12	<i>R. orientalis</i> +.

N.D.=Animal inoculation not done.

Rash was present in 4 out of 12 cases. Inoculation of patients' blood in male guinea-pig elicited febrile reaction in 6 cases out of 9. Only in 2 cases guinea-pigs showed pyrexia and typical Neill-Mooser reaction and *Rickettsia mooseri* were demonstrated in smears from the tunica exudate (table IV, no. 3 and table V, no. 2). Mice were inoculated intraperitoneally with blood from OXK type of cases and *R. orientalis* were successfully demonstrated in peritoneal exudate (table IV, no. 14 and table V, nos. 13 and 14).

In 8 out of 13 cases of typhus fever reported by Patel (1943a) and Patel (1943b) in Bombay, Weil-Felix titre did not rise higher than 1 : 500 even between 9th and 17th day of diseases. van den Ende and others (1943) in 12 cases of murine typhus in previously immunized persons with typhus vaccines observed that the disease assumed a mild form and the Weil-Felix titre did not rise higher than 1 : 500. Such observations and especially those reported from Bombay lend significant support to the author's findings in this article of 14 cases of typhus fever with low-titre reactions.

Conclusions

Typhus, as it occurs in Bombay, is chiefly flea-borne OX19 in type. Cases seen are predominantly mild, with or without rash, simulating other mild infections of enteric fever. The laboratory records of typhus cases in Bombay

do not represent the total incidence of this disease. Cases also occur in which OX19 titres may rise very high or remain low throughout the course of the disease. It is shown that the titre of 1 : 125 in the early stage of the disease can be taken as suggestive only when considered in relation to clinical history, while titres of 1 : 250 or higher as diagnostic of typhus infection. The low-titre reactions require, however, to be confirmed by repeat examinations to demonstrate rise in titre in all cases. Typhoid and para-typhoid infections do not influence Weil-Felix titres and do not give rise to anamnestic reactions and it is also true vice versa. Typhus cases of flea-borne variety may show both OX19 and OX2 titres but the OX2 titre is usually lower than OX19 titre. Ordinarily, OX19 titre does not differentiate epidemic or louse-borne infection from the endemic or flea-borne type, which can only be proved by doing complement-fixation tests. Typhus cases showing low Weil-Felix titres against *B. proteus* OX19 and high titre against *B. proteus* X2 or showing high OX2 titres only against *B. proteus* X2 (table IV, no. 13 and table V, no. 12) are probably cases of tick typhus reported by Megaw (1921) in India or cases allied to Rocky Mountain Spotted fever group of America, transmitted through ticks; the aetiology of this group remains yet to be worked out for India. Typhus cases OXK in type, which is a mite-borne infection, do occur in Bombay, but the number is proportionately

small. Significant titres against *B. proteus* OXK strains occur in relapsing fever (Robinson, 1942; Elsdon-Dew, 1943) which may cause errors in diagnosis. But no such cases have been observed in Bombay during the last twenty years. Typhus cases in which Weil-Felix reactions may remain completely negative throughout the course of the disease are reported in northern Australia and North America known as 'Q' fever. No such cases are reported in India so far. In India, correct data are not available as to the mode of transmission of rickettsial infection from one person to another, because the arthropod vectors and the reservoirs of infection have not yet been thoroughly determined. In spite of all these limitations and those discussed above, Weil-Felix reaction, though a non-specific agglutination test, appears quite diagnostic in at least three known varieties of typhus and should be carried out on every case of continued and irregular pyrexia, mild or severe, with or without rash, taking due care to exclude the diagnosis of enteric infection and certain other non-specific conditions discussed above.

Summary

1. Weil-Felix tests were carried out on 1,263 sera from pyrexial and apyrexial cases and a titre of 1 : 125 was shown to be presumptive of diagnosis of typhus infection in a pyrexial case with suggestive clinical history; a titre of 1 : 250 or over was considered as confirmatory of the disease.

2. 185 sera from proved cases of typhoid and para-typhoid infection were studied in relation to their Weil-Felix titres. The titres recorded were always below 1 : 250 except in one case in which Weil-Felix titre of 1 : 1,000 was observed.

3. The study of Weil-Felix titres in 28 cases of typhus fever showed that high- and low-titre reactions frequently occurred. In cases especially with low-titre reactions, repeated examinations for rise in titre were necessary to arrive at a correct diagnosis.

4. The problem of typhus, as it occurs in Bombay, is discussed with the rôle of Weil-Felix test in its diagnosis and its limitations stressed in the interpretation of results.

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INSULIN SENSITIVITY AMONG INDIAN DIABETICS

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THE conception of the pathogenesis of diabetes mellitus has been greatly modified by the work of Himsworth and Kerr (1939) and later by that of De Wesselow and Griffiths (1938) in showing that a type of diabetes mellitus is due to the inhibition of the action of insulin within the tissues. This has led to the evolution of a new test, *viz*, dextrose-insulin test. Himsworth and Kerr investigated 36 cases of diabetes mellitus and have shown that under the standard conditions of diet and environments, diabetics react in two different ways :—

1. Insulin sensitive—when insulin comes into action rapidly and checks the hyperglycæmia or even causes depression of the blood sugar level.

2. Insulin insensitive—insulin comes into action only slowly and is unable to check the rising hyperglycæmia.

In their 36 cases, 24 proved to be insulin insensitive (= 67 per cent) while only 12 cases were of sensitive type. It was further shown by them that the effect of high carbohydrate diet was favourable to the insulin sensitive type of cases, as it rendered them more sensitive to insulin, while in the insensitive type it increased the glycosuria and also the fasting level of blood sugar with little or no increase in the patient's sensitivity to insulin. De Wesselow and Griffiths (1938) on the other hand showed the transformation of the insensitive to the sensitive type by a change in diet.

It was in the light of the above findings that an investigation on sensitivity to insulin was carried out on Indian diabetics with healthy non-diabetics serving as controls. A procedure somewhat different from that of Himsworth (1940) was adopted—

1. Venous blood (not capillary) was collected for the estimations of blood sugar; as by a simultaneous collection of capillary and venous

blood it has been proved by the above authors that the chief action of insulin lies in promoting the utilization of blood sugar in the peripheral tissues of the insulin sensitive cases, so that it is the venous blood which would better indicate the sensitivity of the tissues to insulin than the arterial (capillary).

2. Collection of specimens of blood was also done every $\frac{1}{2}$ hour for $2\frac{1}{2}$ hours and not for a shorter period of $1\frac{1}{2}$ hours as was done by Himsworth who collected the blood every ten minutes. This procedure was adopted by us in order to avoid any disparity in the timings of blood collection between the curves of dextrose-insulin test and that of the plain glucose-tolerance test. Moreover, it would further indicate the changes in the blood sugar for a longer period ($2\frac{1}{2}$ hours). In the beginning of this investigation blood was collected in a few cases every 15 minutes for the first hour but that did not seem to modify the curve and hence was given up.

3. In our series, glucose-tolerance tests were done by giving glucose at the rate of 30 gm. per square metre of the body surface and thus keeping a uniform standard of the amount of glucose in both the glucose-tolerance and dextrose-insulin tests. This was done for two reasons: (i) The two test curves may be uniform and comparable to each other and thus be able to demonstrate the action of insulin. (ii) It stands to reason that in a thin, emaciated and short statured person, the curve after giving 50 gm. of glucose cannot be compared to a curve after giving the same amount (50 gm.) of glucose to a tall obese person, because the amount of glucose utilized by the tissues should naturally depend on the body surface; hence for this test as well, the glucose given should be calculated according to the height and weight, as in the case of dextrose-insulin test. The amount of insulin was calculated at 5 units per square metre of the body surface determined from the height and weight formula of Du Bois as was done by Himsworth (1936). Lilly's make of insulin was used.

The diabetics were collected mostly from the wards of the College Hospital, where they were getting the full diet of the hospital, which contained a liberal amount of carbohydrates. A few who came from outside were also instructed to take a liberal carbohydrate diet as the carbohydrate deprivation leads to insulin insensitivity in both healthy and diabetic individuals.

The healthy controls were taken from the ophthalmic wards of the hospital, where they were admitted for some minor eye troubles and were getting the same full diet.

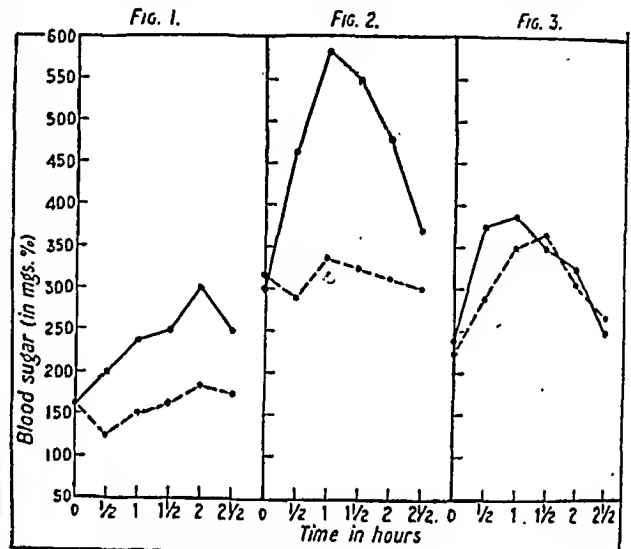
The typical curves from our series are shown in the following figures while the curves drawn by Himsworth and Kerr (1939) are shown in figure 5.

Comparing the curves of the two series, they seem to behave in a similar manner for the first hour so that the reading of sensitivity to

insulin in both the sets of curves during the one-hour period gives the same results. It is the further course of the curves which elicits the differential points of the two series.

I. Cases of diabetes mellitus

Thirty-six cases were investigated, ranging from mild cases to severe ones, varying in age from 21 years to 68 years. From the study of the insulin-dextrose curves of these patients it was clear that different grades of sensitivity were present ranging from an extremely sensitive to an almost insensitive type. Broadly speaking in this series: (1) Twenty-four cases were of the insulin sensitive type. (2) Five cases were of the insulin insensitive type. (3) Seven cases



Curve 1.—Typical sensitive type, from a case of moderate diabetes.

Curve 2.—Typical sensitive type, from a case of severe diabetes.

Curve 3.—Typical sensitive type, from a case of severe diabetes.

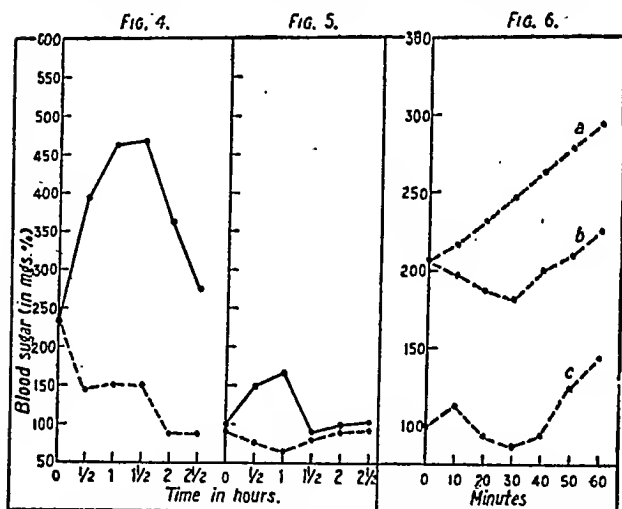
showed features difficult to classify within either group and were called intermediate type.

The criterion for this classification was that in the sensitive type of curve the insulin either suppressed or checked any rise of blood sugar for 1 hour; while in the insensitive type it failed to restrain the rising blood sugar and the curve remained more or less similar to the plain glucose-tolerance curve (e.g. curve 3). Others which did not fall into these two categories were named intermediate type; they showed:—

(a) Delayed action of insulin, i.e. there was an initial rise of blood sugar like that in the ordinary glucose curve but this was followed by a marked fall after $1\frac{1}{2}$ hours. This fall probably was simultaneous with the secretion of patient's own insulin. In one case of our series under this type, the blood sugar came down to a hypoglycæmic level (curve 7).

(b) An initial depression of blood sugar, i.e. in the first $\frac{1}{2}$ hour specimen after giving insulin and glucose. But very soon the blood sugar

started rising very high as if the insulin had been thrown out of action altogether. (e.g. curve 8).



Curve 4.—From a case of severe diabetes showing extreme sensitivity to insulin.

Curve 5.—Normal curve.

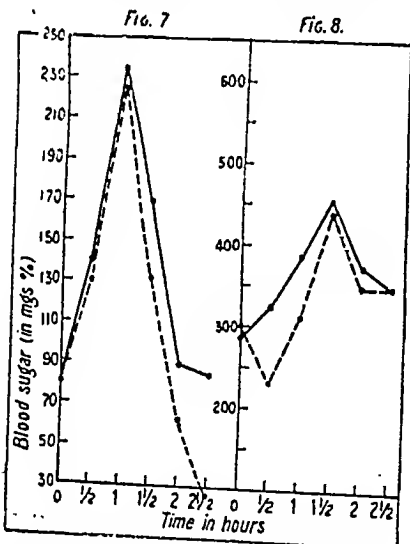
Curve 6.—Dextrose-insulin curves drawn by Himsworth.

(a) Insensitive type. (b) Sensitive type.

(c) Normal curve.

II. Control cases (normal healthy adults)

Twenty-four normal healthy individuals were tested including 10 persons above 45 years of age. In these non-diabetics the sensitivity to insulin showed variation from person to person. In some the fasting blood sugar was depressed to hypoglycæmic level in $\frac{1}{2}$ to 1 hour, though without any symptoms it quickly returned to normal. In others only slight depression of

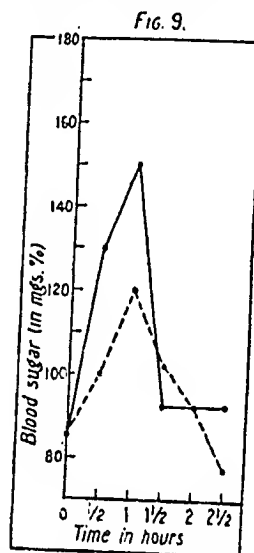


Curve 7.—From a case of intermediate type showing delayed action of insulin.

Curve 8.—From a case of intermediate type showing initial depression followed by high rise of blood sugar.

10 to 20 mg. per cent of blood sugar was produced, followed by its return to normal or a little higher; still others had a comparatively irregular course. These normal curves essentially resembled sensitive diabetic curves.

In two out of this series of 24, the insulin response was poor, i.e. the blood sugar kept on rising after the administration of insulin and glucose for the first hour and the curve resembled the plain glucose-tolerance curve though less in its height (e.g. curve 9). This suggested that in certain individuals above 45 years of age ($= 1/5$ th of the total number in this series) there was less insulin sensitivity than others, so that they might be called 'potential diabetics' of the insulin insensitive variety. These cases, in spite of showing insensitivity to insulin, still possessed that amount of insulin response which prevented them from becoming diabetics.



Curve 9.—From a control case showing poor insulin response.

Review

It has been seen from the above that both in health and diabetes, insulin sensitivity varied from person to person on a more or less same diet and even with liberal amounts of carbohydrates. The two conditions, viz, insulin sensitivity and insensitivity, should not be regarded as two rigid and inelastic types as certain cases in our series showed intermediate or irregular type of response to insulin.

Thus both in the healthy and in the diabetics one may find different grades of sensitivity to insulin.

A. *Sensitive*. 1. Those markedly sensitive to insulin who react by marked suppression of their blood sugar (even amounting to hypoglycæmia in some healthy individuals).

2. Those showing sensitivity in a moderate degree reacting with an initial suppression of the fasting level of blood sugar which is soon restored to the normal and is maintained on it or slightly above (compare curves 1, 2 and 4).

B. *Insensitive or insulin resistant*. This includes those normal individuals of advanced age who are potential diabetics, i.e. who still retain that minimal amount of sensitivity to insulin which checks them from becoming

glycosurians. In others the insensitivity is pronounced enough to declare them diabetics.

C. Intermediate type. These have been described above. In healthy controls too, different grades of sensitivity were found between the two extremes of sensitive and insensitive types.

In the present series of 36 diabetics, the relative frequency of the sensitive and insensitive types showed figures reverse to those reported by Himsworth and Kerr.

5 were of insensitive type .. 14 per cent.

24 were of sensitive type .. 67 per cent.

7 were of intermediate type 19 per cent.

We are thus inclined to think that among the Indian diabetics the insensitive type is the least frequent.

Out of the healthy controls, only 2 (out of 24) were placed in group B, i.e. potential diabetics. From this series it seems that the potential diabetics among Indians are only 12 to 13 per cent.

Clinical features

It has so far been emphasized in the literature as pioneered by Himsworth and Kerr that there are clinical differences too, between these two types of diabetics, viz, the insulin sensitive type of cases are younger in age and thin built, their blood pressure is normal and their arteries are healthy and that their onset is sudden, severe and with marked symptoms. The insulin insensitive type is said to be obese, older and plethoric with hypertension and arteriosclerosis, having an insidious symptomless onset with only an accidental discovery of glycosuria. The cases recorded and investigated here absolutely differ from the classical description given above. In our series not one out of the five of the insensitive type was obese or plethoric or even symptomless. All the five complained of loss of weight along with thirst and polyuria. There were a few amongst the sensitive type in whom the onset of the disease remained unnoticed by the patient; glycosuria having been discovered in them, only when a few years later, they had some surgical complication. The most obese and plethoric patient of our series was a man of 42 years of age with 342 lb. weight for a height of 67 inches, and a blood pressure of 115/80 with a history of diabetes for the last 10 years but had no symptoms at all. Sugar had been discovered in his urine 10 years back when he got a carbuncle. His marked sensitivity is shown in curve 2.

Out of the 36 diabetics investigated, 16 were above 45 years of age of which 2 were of insulin insensitive type. The other three insulin insensitive type of cases were young men of 30 to 35 years of age, emaciated and thin with symptoms of polyuria and thirst. Thus the distribution of the insulin sensitive and insensitive types is irrespective of age. We are thus

inclined to say that amongst Indians the classical description of the two types of diabetics as given by Himsworth does not at all hold true.

Summary

1. Some modifications of both the dextrose-insulin test as well as of the glucose-tolerance test are suggested to enable making an uniform comparison of the two types of curves in the same person as well as in different individuals. The modified technique of dextrose-insulin test not only avoids too frequent pricks for the patient but also gives a better idea of insulin sensitivity as venous blood would indicate insulin sensitivity better for the reasons described above, while the longer duration of curve affords a better study of the range of insulin reaction in the patient.

2. The relative proportion of insulin sensitive and insulin insensitive types of Indian diabetics is found to be 67 per cent and 14 per cent respectively.

3. Sensitivity to insulin is shown to have every gradation from person to person in health and in diabetes. An intermediate type between the sensitive and insensitive types of diabetics has been described.

4. Classical description of the clinical features of the two types of diabetes (sensitive and insensitive) has not been confirmed and does not hold good for Indian diabetics.

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PHTHALYLSULPHATHIAZOLE IN THE TREATMENT OF CHOLERA

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PHTHALYLSULPHATHIAZOLE has been reported to be an effective remedy in the treatment of dysentery, diarrhoea and other intestinal fluxes. Streicher (1945) considers this drug to be less toxic and more effective than any other intestinal antiseptic previously used. It was considered

desirable to try this preparation* in the treatment of cholera. The patients, who were in-patients of a cholera hospital, were divided into two groups on admission. The first group was treated with phthalylsulphathiazole 3 grammes, 4-hourly during the acute stage of the disease and twice a day for two days afterwards. The second group served as control. All patients received the usual saline supportive treatment. All patients were suffering clinically from cholera. The clinical diagnosis was confirmed by the isolation of agglutinable vibrios in a number of cases, but it was not possible to make full bacteriological examination in each case.

The selection of cases for treatment was made on alternative admission basis. The only criterion used in the analysis of treatment has been recovery or death. Whether the patients died within few hours after admission or whether death occurred from other causes than cholera, has not been taken into account. All cases were taken as cholera and all deaths due to cholera.

Results of treatment of parallel series of cholera cases with phthalylsulphathiazole, and a control series not receiving any sulphonamide drug

	Treated with phthalylsulpha- thiazole	Control
Number in series	331	335
Number recovered	307	301
Number died ..	24 or 7.3%	34 or 10.1%

Although the death rate (7.3 per cent) is less in the phthalylsulphathiazole series than in the control series (10.1 per cent) the difference is not significant.

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SULPHASUXIDINE IN THE TREATMENT OF CHOLERA

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In the report of the Indian Research Fund Association of 1944 (page 2), it was reported that 118 clinically diagnosed cholera cases were

treated with sulphasuxidine and a similar number of alternately admitted cases used as controls. The usual saline supportive treatment was given to both series. Death rate in the sulphasuxidine treated and control series was 10 per cent. As far as we are aware, no further trials of sulphasuxidine in the treatment of cholera have been reported. During the recent cholera epidemics it was decided to try sulphasuxidine in a series of cases. The selection of cases for the treatment with sulphasuxidine was on alternate admission basis. The patients were suffering clinically from cholera. The clinical diagnosis was confirmed by the isolation of agglutinable vibrios in a number of cases, but it was not possible to make full bacteriological examination in each case. Sulphasuxidine was given in dosage of 3 grammes, 4-hourly during the acute stage of the disease and twice a day afterwards for two days. The results are presented in the table :—

	Treated with sulphasuxidine	Not treated with sulphasuxidine
Number treated	195	194
Number recovered	184	182
Number died ..	11 or 5.6%	12 or 6.2%

Sulphasuxidine in the dosage used had no effect in reducing the mortality in cholera. No untoward effects were noted in cholera cases after its use.

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AN OUTBREAK OF PELLAGRA SYNDROME IN A RURAL AREA OF BENGAL

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EARLY this year a local daily paper reported about an outbreak of a 'mystery disease' in Navadwip in the district of Nadia about 66 miles from Calcutta. The Chairman of the Municipality had also written to the Director of the School about it, emphasizing a state of panic amongst the villagers. As directed by the latter three patients were brought and admitted to the Carmichael Hospital for Tropical Diseases on 26th February, and we visited the affected locality on 4th March and again on 18th for investigation.

* The phthalylsulphathiazole used in this trial was kindly donated by Messrs. May and Baker Ltd. and Messrs. Herts Pharmaceuticals Ltd., England.

Information collected showed that the town of Navadwip itself was not affected although a few patients had gone there for treatment. The disease was mostly confined to a section of a village called Gholapara-Fakirdanga situated at a distance of five miles from it on the opposite bank of the Ganges. We were told that the disease was not quite new to the locality; it had occurred several times before, though not regularly since 1938, with a number of deaths. The present outbreak began at about the end of December 1946, and lasted till about the end of March 1947.

This village consists of three parts—the northern, central and southern—occupied by Hindus, Moslems and Hindus respectively, the disease being confined to the last section only. This area contains some 50 houses with a population of about 400 of which nine families were affected. The incidence of the disease in different families is given below :—

Family incidence

Serial number	Total members	Number affected	REMARKS
1	9	9	Including a pregnant woman who died three months later.
2	4	4	One died.
3	2	2	
4	7	3	
5	2	2	This family consisted of 7 members. All were affected last year when 5 died.
6	5	1	
7	4	1	
8	3	2	
9	4	2	

The patients.—The subjects of this analysis were 22 patients including three that were admitted to the hospital and another patient brought to us during our second visit from an adjoining village in which one whole family of 5 members was affected (not included in the above table).

They are mostly cultivators by occupation and own some lands; the men work in the fields, the women engage themselves in domestic duties. They live on the sale of field products, keeping what is just necessary for their own consumption. A number of them belong to the poor labouring class, some being engaged as servants. In this series, family no. 1 had a servant who lived with his own family but took all meals at his master's house. He fell a victim to the disease but his own people were unaffected.

Rice is the staple food; they use their own rice parboiled and husked at home while poorer classes who do not possess any land usually buy it from Navadwip market where it is uncontrolled. It is supplemented by vegetables and dal. Some take a little milk, but fish, eggs, fruits

and meat are hardly ever taken. Usually they have three meals a day, all consisting of rice and vegetables, the early morning meal being the rice kept overnight in cold water. They throw away the rice-water after cooking. As a rule, they use the Ganges water for drinking purpose except during rains when it gets very muddy and they use well-water. The dietary did not differ in any way from that of the non-affected people.

We collected samples of rice from some affected and some unaffected families in this locality. A notable difference in the naked-eye appearance was obvious between the two groups of samples. Samples from affected families invariably contained many grains which were black, while those from unaffected families contained none. The former was also said to give a slightly bitter taste on chewing. We were told that owing to scarcity of water in certain fields (presumably on higher levels) many of the paddy grains were 'dead' and turned black during preparation. The affected families had paddy fields close to each other in one area.

Sex.—The series included 13 males and 9 females. It is evident therefore that both the sexes were almost equally affected.

Age.—Their age distribution is given below, the youngest being 5 and the oldest 55 years.

Under 15 years	..	..	6
15 to 25 years	..	..	8
Above 25 years	..	..	8
			—
			22

Clinical features.—From the history of the duration of the illness the patients can be divided as follows :—

Duration	Number of cases
Under 4 weeks	.. .. 3
4 to 6 weeks	.. .. 9
More than 6 weeks	.. .. 10

There was history of similar attacks in both the members (mother and daughter) of the family no. 5 last year when five others had died of it. The mother had still evidence of peripheral neuritis presumably as a sequel to the last attack. The onset of illness was insidious.

Gastro-intestinal symptoms were complained of by 20 patients. The incidence of these symptoms which persisted in many of them is shown below :—

Anorexia	.. .. 18
Nausea	.. .. 16
Diarrhoea	.. .. 7
Ptyalism	.. .. 7
Gripping pains	.. .. 7
Vomiting	.. .. 2

Some form of dermatitis was a constant feature. It was actually present during our

examination in 19 cases, the lesions having cleared up in 3. It appeared first on the face in 8 cases, on the feet in 8 cases and on the hand in one case. The remaining patients were not sure of the initial site of lesions. The usual story was that after a few days of prodromal gastro-intestinal symptoms reddish brown patches appeared on the face, usually in the malar region and/or dorsum of the feet or hands. Those on the face appeared on both sides and looked like severe sun-burn or erythema which persisted as such for a variable period and then the patches became dark and rough followed by desquamation. In this series 16 patients had definite cutaneous changes on the face. Except one left with hypopigmented patches all of them had flushed or hyperpigmented areas, the face being definitely puffy in three. The patches on the extremities rapidly became dirty black and rough and were confined mostly to the dorsal aspect of hands and feet.

The lesions appeared to be typical pellagra dermatitis in 9 out of 19 cases. They were symmetrical, the affected skin being thickened, rough, black and sharply demarcated from healthy skin. The remaining ten patients that we saw had also pigmentary dermatosis of hands and feet but the lesions were of different and varied type unlike classical pellagra lesions. Some had no dermatitis on the dorsum of the feet but the outer borders of their feet became brown, and then darkened, keratinized and peeled. The dorsum of several toes or fingers (especially knuckles and inter-phalangeal joints) turned brown or deep black in some. Sudden or ulcerated condition of the clefts between toes were also seen in a number of them. Deep fissures or cracks developed in the soles and palms of some patients. A few had symmetrical dark patches on both malleoli or heels.

Other lesions in this series included cheilitis in 4, angular stomatitis in 5, glossitis in 7 and tremulous tongue in 8. One woman (family no. 5) who also had the disease last year showed evidence of peripheral neuritis.

Examination of other systems showed no obvious abnormality. General health was fair

in most cases. The blood pressure was within normal range. There was one death this year—a boy of family no. 2—the terminal symptom being vomiting of blood.

Some of the hæmatological findings are given in the table. The hæmoglobin in a series of 13 patients varied from 10.2 gm. per 100 c.c. (75 per cent) to 14.85 gm. (108 per cent). Excepting 3 all had hæmoglobin above 11.0 gm. (80 per cent). It was also estimated in 7 unaffected individuals of the locality. This varied from 11.8 per cent to 13.95 gm. Thus the hæmoglobin level of these patients was what is about the average in this class of people.

Plasma protein estimations done on a representative series of 13 patients showed that the mean plasma protein concentration was 6.2 gm. per 100 c.c. compared with 7 gm. per 100 c.c. for the control group, whereas the mean plasma albumin level was 3.3 gm. and globulin 2.9 gm. per 100 c.c. Thus there was some reduction in plasma protein which was entirely in the albumin fraction with globulin normal or slightly increased in some cases.

This is shown in the low 1.1/1 albumin/globulin ratio compared with a normal of 1.8/1.

Examination of urine and stools of 3 patients admitted to the hospital showed no abnormality. W.R. was negative and gastric analysis showed presence of free HCl. Nicotinic acid excretion was normal in two cases and defective in one.

Treatment.—In hospital, two patients (cases 8 and 19) were given full hospital diet and one patient (case 9) was kept on milk diet for a week. This alone was sufficient to cause some improvement. Thereafter the first two patients were given nicotinic acid 300 mg. daily for 12 days while the last one was put on full hospital diet but without nicotinic acid. This caused further improvement; the skin lesions practically cleared up, and they were discharged on 15th March, 1947.

In this village 6 patients had treatment given by a local doctor who advised better diet with

Serial number	Case number	Hæmoglobin		Total protein gm. per 100 c.c.	Albumin gm. %	Globulin gm. %	Albumin/Globulin ratio
		gm. %	Hellige %				
1	1	12.1	88	6.2	2.7	3.5	0.8
2	2	11.5	84	6.5	3.6	2.9	1.24
3	3	12.4	90	6.2	3.5	2.7	1.3
4	7	13.5	98	6.2	3.6	2.6	1.4
5	8	14.0	102	6.2	3.3	2.9	1.1
6	9	13.2	96	5.8	3.5	2.3	1.5
7	10	11.0	80	5.8	2.6	3.2	0.8
8	11	10.5	76	5.8	3.3	2.5	1.3
9	12	10.3	75	5.4	2.6	2.8	0.9
10	17	11.8	86	7.5	3.7	3.8	0.9
11	19	12.9	94	6.8	3.8	3.0	1.2
12	20	14.8	108	5.8	3.0	2.8	1.7
13	21	12.1	88	6.8	4.0	2.8	1.4

fish daily and gave them a course of about 12 or more injections of nicotinic acid; all improved. The remaining patients had little or no treatment and their condition was either stationary or progressive at the time of our visit. They were advised to

(a) change the rice,

(b) supplement the diet with germinating grams, peanuts (china badam), fish, milk and tomatoes,

(c) nicotinic acid by mouth.

After a fortnight, during our second visit, we found that all had changed the rice straightway, but only a few had any supplements and had just started (not more than 3 days) nicotinic acid. Some had also multivitamin tablets. All improved and there was no more fresh case (except case 22 who belonged to a different village and was not seen before).^{*} This seems to show that the common factor leading to improvement was the change of diet, presumably the rice.

Discussion

Clinically the condition appeared to be pellagra. Practically in all the cases the disease started with gastro-intestinal symptoms such as anorexia, nausea and diarrhoea. This was followed by a skin lesion which was typical in 9 out of 19 patients we had occasion to examine. Quite a number of them had tremulous tongue and some had other deficiencies as well, viz, cheilitis, angular stomatitis and glossitis. One woman who had previously suffered from it and also got an attack during the present outbreak showed evidence of peripheral neuritis. The diet of the community is grossly deficient and seems to be the cause of the syndrome. Judging from the symptoms there must be multiple deficiencies, mostly of vitamin B complex, concerned in its production. It is however not clear why a larger part of the community having the same diet remained apparently free. The only difference that we could notice was that the rice of those who had the disease had a large number of black grains imparting a bitter taste unlike the rice of the non-affected people. It was thought that these 'dead' grains might have been deprived of the bulk of their natural vitamin B complex including nicotinic acid. The nicotinic acid content of the samples of rice was however found to be within normal range. Another possibility is the presence of some toxic substance in those grains precipitating the deficiency state.

Our thanks are due to the Chairman, Navadwip Municipality, for assistance in this investigation, and to Dr. Rajagopal, All-India Institute of Hygiene and Public Health, Calcutta, for estimation of nicotinic acid in the rice samples.

XANTHOMA DIABETICORUM

(A CASE RECORD)

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XANTHOMA DIABETICORUM is undoubtedly a rare complication of diabetes. A review of the literature on the subject by various workers in the field shows that during the last 100 years the number of cases described would not exceed a hundred and fifty. One of us (J. P. B.) during the last 25 years came across only two typical cases. This evidently has been the experience of most of the other workers in the field.

The first description of this disease was given by Addison and Gull (1850) who gave such an admirably clear description of the skin lesions in Xanthoma Diabeticorum, that it still remains unsurpassed. In describing the skin lesion of their diabetic patient, the authors wrote: 'An eruption somewhat suddenly appeared on the arms, at first apparently of a lichenous character. In the course of 10 days, it had extended over the arms, legs and trunk, both anteriorly and posteriorly, and also over the face and into the hair. It consisted of scattered tubercles of various sizes, some as large as a small pea, together with shining coloured papules. They were most numerous on the outside and back of the forearm and specially about the elbows and knees where they were confluent. Along the inner side of arms and thighs, they were more sparingly present, and entirely absent from the flexures of the larger joints. They were of a yellowish colour, mottled with deep rose tint, and with small capillary veins here and there ramifying over them. They were accompanied with a moderate degree of irritation, hence the apices of many were rubbed and inflamed.....'. Similar cases were described by many workers. Walker in 1897 reviewing the literature on the subject during the previous 50 years could collect only 30 cases. Major (1924) collecting cases of Xanthoma Diabeticorum from the literature during the previous 75 years could collect only 74 cases, he himself describing 4.

Coming to the more recent literature, Wise and Garb (1942) described a case of an unusual form of eruption of Xanthoma Diabeticorum in which the lesions were composed of keloid-like growths on the extensor surfaces and sides of the upper and lower extremities.

The skin condition as described by various authors since it was first described about 100 years ago by Addison and Gull in 1850, though differing in minor details, appears generally to conform to the following descriptions:—

1. That the eruptions were of a spotty distribution with predilection for extensor

^{*} No case was encountered during our third visit, several months later.

surfaces of the feet, arms, elbows and the extensor surfaces of the body.

2. The size varied usually from that of a pin head to a small pea.

3. The eruptions were usually symmetrical and discrete but confluent papules attaining various sizes have also been described.

4. The nodules were usually of a yellowish or brown colour with a red inflammatory areola round the nodules.

A careful study of the literature on Xanthoma Diabeticorum clearly indicates that certain differences of opinion exist as to the correctness of the diagnosis in some of these cases. Without going into controversial details of discussion it appears to us that although the criteria for diagnosis may be too severe, yet certain cases, described in the literature as Xanthoma Diabeticorum, probably have no claim to this title.

Description of the skin condition of the present case

Practically the whole body and the extremities were covered with small yellow coloured papular lesions. The extensor surfaces of the limbs suffered more than other parts. On the face, the lesions were small, discrete and confined mostly to the forehead. On the trunk, the back suffered more than the front and the lesions were small and discrete. The back of the elbows and front of the knees were the worst (figure 1, plate XXVI). On the hands, the lesions on the sides and back of the fingers and the webs between the fingers simulated scabies (figure 2, plate XXVI). The palms of the hands and soles of the feet were sparsely affected. The thighs, legs and dorsum of the feet had the same conditions like the upper limbs. The individual lesions were yellow or orange-coloured flat-topped papules varying in size from a pin head to that of a split pea. Most of these were solid but some were soft in consistency. Over the big joints and on the extensor surfaces of the limbs, some of the lesions coalesced to form fair-sized plaques. The red areola around the papules described in the textbooks were not marked. The lesions were irritable but not so severe as to cause any abrasions due to scratching.

Histopathology

The epidermis was mostly unaffected. The main changes were confined to the corium. In the sub-papillary layer, the capillaries were dilated in the affected area and there were cellular infiltrations round the dilated capillaries and also throughout the corium. These cells consisted of endothelial cells, round cells and epithelioid cells. There was all-round fatty fibrous degeneration in the corium, the fatty degeneration more marked than the fibrous changes which were just beginning. Throughout the whole corium were found deposits of fat globules and granules both inside the degenerated cells and in the intercellular spaces (figure 3, plate XXVI).

The fatty deposits consisting of fat globules and granules were due to fatty infiltration in the corium and fatty degeneration inside the cells. The cellular degenerations consisted of formations of large cells derived from connective tissue, the nuclei were small and deeply stained and the protoplasm full of fatty materials. Some of these cells contained more than one nuclei. The fibrous changes were slight and just beginning but the cellular changes were well marked giving the appearance of the lesions being inflammatory in character. The histological picture was that of xanthoma of inflammatory nature.

Observations upon the appearance of blood or upon the blood chemistry of patients with Xanthoma Diabeticorum have been few in number: all recent observers, however, agree that a condition of lipæmia and hypercholesteræmia occurs in almost all cases.

The question whether Xanthoma Diabeticorum is solely due to lipoidemia or is the result of some inflammatory reaction produced by a slight trauma has been the subject of a long debate. One such case has been described by Major in 1924. A young diabetic boy with a blood sugar of 322 mg. and a blood cholesterol of 400 mg. per 100 c.c. was bitten in two places on the forearm by a mosquito. Two small inflammatory nodules were produced and a few days later a deposit of yellowish orange pigment appeared, and the nodules became quite hard and presented a typical appearance of the lesions of Xanthoma Diabeticorum. We hold that trauma may be the *immediate* causative factor in these cases and agree with the author that lipæmia is an essential factor and a condition precedent without which Xanthoma Diabeticorum cannot occur.

Clinical features

The case described in this paper presented a few unusual features, the most noteworthy being that though the hyperglycæmia and the lipæmia were pronounced and though the skin lesions were widespread, the marked improvement in the clinical condition, the quick disappearance of the hyperglycæmia and the lipæmia and the resolution of the skin lesions were almost dramatic. On a review of the literature we find that a case of a similar nature was described twenty years ago by Goldstein and Harris (1927). It is also significant to note that a fat-free, high carbohydrate diet with insulin produced a fall of both blood sugar and blood cholesterol. The smaller nodules disappeared but the larger areas having a poor blood supply did not respond so easily.

Though there were clinically no signs of acidosis at the time, it was feared that on account of the faulty fat and carbohydrate metabolism this condition might develop if precautions were not taken immediately. Fat-free diet was therefore prescribed.

Such a serious state of affairs as noted above occurring particularly in a young boy naturally suggested a bad prognosis at the outset but the boy improved rapidly on treatment and left hospital in quite good health.

The nodules were usually symmetrical, about the size of a thick pin head or head of a match stick. They were slightly irritable and bled readily when scratched. Discomfort, however, began to lessen as the patient's condition improved.

The patient was a village schoolboy aged 20 years. No definite history of severe polyuria, thirst, emaciation and extreme weakness could be obtained for the last 6 months or so. According to the patient the 'eczematous' condition of the hand and feet with swelling was recent (about 3 weeks) and that was what made the parents anxious to put the boy in hospital.

On a preliminary clinical examination the first thing that struck us was that the boy was mentally sluggish. On enquiry it was revealed that the father also noticed this mental change in the boy which he attributed to severe ill health. The boy could understand questions put to him but his answers were incoherent and vague. The diabetic condition of the patient was severe. The patient had a polyuria reaching 5,760 c.c., a glycosuria of 8.0 per cent and a daily waste of 460 gm. of glucose. The fasting blood sugar level, 0.340 per cent, and a low carbohydrate tolerance as evidenced by the results of the glucose tolerance tests. Added to this was the xanthoma and the obvious deficiency in fat metabolism as evidenced by the very high lipid and the cholesterol content of the blood.

It would be interesting to note here that when the first sample of venous blood was collected it was found to have a curious opaque or cloudy appearance and a white 'cream' rapidly separated on the top of the fluid (lipæmia).

Other laboratory findings

The following are some of the other findings elicited during the routine examination of the patient:—

Stool.—

Negative for protozoa in 4 serial examinations.

Ova.—

Ascaris ++ } for which a thorough treatment
Trichuris ++ } was given.

Blood count.—

R.B.C. 555,000

W.B.C. 12,600

Polymorphs 72%

Lymphocytes 18%

Large monocytes 7%

Eosinophiles 3%

Blood chemistry.—

Blood sugar 0.340%

Urea N. 0.010%

N.P.N. 0.028%

Calcium 0.010%

Uric acid 0.0028%

Cholesterol 0.720%

Glucose tolerance test (oral method).—

Fasting blood sugar	0.340%
½ hour after 30 gm. of glucose ..	0.360%
1 hour after 30 gm. of glucose ..	0.390%
1½ hours after 30 gm. of glucose ..	0.340%
2 hours after 30 gm. of glucose ..	0.336%
Urine sugar before	7.5%
Urine sugar after	10%

Glucose tolerance test (I.V. method).—

(Dose—0.2 gm. per kilo.)

Fasting blood sugar	0.230%
15 minutes after glucose	0.320%
30 minutes after glucose	0.345%
45 minutes after glucose	0.285%
1 hour after glucose	0.260%
1½ hours after glucose	0.240%
Urine sugar before	4.5%
Urine sugar after	7%

Urine.—

Sugar	8%
Albumin	+
Acetone	+

The patient was put under intensive antidiabetic treatment (fat-free diabetic diet with insulin) and the result was extremely satisfactory. The blood sugar returned to the normal level and the urine became free from sugar and acetone within a short time. Along with the improvement in the diabetic condition the skin condition improved considerably until it finally disappeared. He was discharged apparently cured on 25th March, 1947.

Summary and conclusions

1. A rare case of typical Xanthoma Diabeticorum in a young boy of 20 years has been described.

2. The noteworthy features of the present case were the marked improvement in the clinical condition, the quick disappearance of hyperglycæmia and lipæmia and a resolution of the skin lesions though the hyperglycæmia and the lipæmia were pronounced and though the skin lesions were widespread.

3. It appears to us that Xanthoma Diabeticorum is related more closely to the fat metabolism of diabetes mellitus than to the carbohydrate metabolism.

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UNUSUAL FATAL HÆMORRHAGE COMPLICATING ENTERIC FEVER

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ENTERIC fever is remarkable for the large number of complications which may occur during its course. Most of them are very well known to the medical profession with their pathogenesis and prognostic significance. In this paper the writers intend to discuss a very serious complication which they have met with in the routine management of their enteric cases. The literature on the subject is extremely meagre and their clinical description is hardly found in any textbook. The pathogenesis of the condition is a matter of speculation but the prognostic import is very definitely bad. It is for these reasons that the subject is brought forward to elicit opinion and stimulate scientific interest.

Clinical features of these cases are as follows: A case of long-continued fever proved bacteriologically and serologically to be due to one of the enteric group of infections runs its entire course without any incident during the first 2 or 3 weeks. Towards the end of the course of the fever or in some cases even when the temperature has subsided and the patient is in the stage of convalescence and for all practical purposes considered fairly out of danger, he suddenly has a set-back due to an unusual complication, *viz*, vomiting. At first, the physician takes it to be due to some error in diet producing perhaps a mild gastritis. This complacency is, however, soon changed into a serious matter when the patient begins to show presence of blood in the vomited matter—either frank blood or altered blood or more usually coffee-ground material. The quantity may be moderate or large and the number of vomits may be as many as 10 to 12. There may be some mucus along with the blood. With this hæmatemesis, sooner or later, the patient begins to pass blood *per anum*—usually melæna of large or small quantity. In a few cases, the melæna may precede the hæmatemesis. The patient sooner or later develops some degree of jaundice, becomes rapidly anæmic, passes smaller and smaller quantities of urine and finally dies.

In a group of 10 cases studied, this complication appeared on an average between the 18th and the 24th day of the illness. In 2 cases, however, it started as early as the 10th day, whereas in another 2 cases, it appeared as late as the 32nd and 52nd days respectively. The temperature, just previous to the onset of the complication, showed interesting features. In 5 cases, it was normal for a variable period of 1 to 8 days before the hæmatemesis started. In

3 cases, the fever was coming down by lysis when vomiting began and the temperature maintained normal till death occurred. In one case, the temperature was subnormal. There was only one example where the complication started when the temperature remained high (103°F.). Signs and symptoms of intestinal hæmorrhage with passage of tarry stools occurred in 2 cases just previous to the onset of the hæmatemesis. Three cases had melæna after the hæmatemesis. In the remaining 5 cases, hæmorrhage from the stomach was not associated with visible hæmorrhage from any other part of the gastro-intestinal tract. Purpuric spots appeared on the hands and forearms in one case only. Except 2 cases, where the vomited material consisted of frank blood, there was altered blood in all the rest and the vomited matter looked like coffee-ground material. In 6 cases, jaundice developed, preceding or following the hæmatemesis by a day or two.

Widal reaction was positive in 5 cases. Blood culture was successful in 3 cases while in 2, neither was positive. These latter cases were, however, clinically typical enteric fever. Bleeding time and coagulation time determined in 3 cases after the onset of the vomiting showed normal values. Platelet count was normal. Prothrombin time was determined in 3 selected cases in which both the bleeding and coagulation times were normal. The figures were definitely prolonged in all the 3 cases.

All the 10 cases proved fatal. The average period of survival after the onset of this complication varied between a few hours and six days.

Case reports

Case 1.—Indian Christian, married female of 22 years, admitted on 5th July, 1946, with a history of continuous fever for 2 weeks, and had severe headache in the first week. Patient looked wasted, anæmic and toxæmic. Tongue coated and dry. P/R—120/28. Temperature 102°F., liver and spleen not palpable. No abnormality in the heart and lungs. Rose spots over the chest and abdomen. Laboratory findings: Hb. 32 per cent (Hellige), red cells 1.95 millions. W.B.C. 7,200. Polymorphs 64 per cent, lymphocytes 35 per cent, large monocytes 1 per cent, no malarial parasites, Widal T_H 1 in 150, urine and stool—no abnormality. On 6th, fever dropped to 97°F. and all the signs and symptoms of collapse appeared. Treated promptly with blood transfusion and other necessary supportive measures. Temperature rose and fluctuated between 101°F. and 103°F. General condition looked fair. On 10th, the patient passed a tarry stool and vomited once. The vomited matter contained blood. From 12th to 14th, the patient had two bouts of coffee-ground vomit each day. Temperature remained normal all these days. Patient developed slight jaundice. P/R—120/30 to 32. Bleeding time and coagulation time were 2 and 5 minutes respectively. Prothrombin time 44 seconds (normal control 22

seconds). The condition of the patient progressively deteriorated and she died on 15th. No autopsy was permitted.

Case 2.—An unmarried Hindu male, aged 20 years, admitted on 1st July, 1946, with a history of continuous fever for 3 weeks and severe headache in the first week. On examination, the patient looked anæmic and toxæmic. Tongue coated and furred. Temperature 104°F. P/R—112/32. Spleen enlarged 2 fingers, liver not palpable. Heart—N.A.D. Scattered rhonchi in both lungs. Laboratory findings: W.B.C. 4,500. Polymorphs 60 per cent, lymphocytes 38 per cent, large monocytes 1 per cent, eosinophils 1 per cent, no malarial parasites detected. Widal reaction and culture both negative. Urine and stool—normal. On 7th, temperature came down to normal but other conditions did not improve. On 11th, jaundice appeared and the patient got an attack of hæmatemesis. Bleeding time and coagulation time were within normal limits. Prothrombin time 38 seconds (control 25 seconds). On 12th, patient got 3 attacks of hæmatemesis and collapsed. Blood transfusion was given along with other supportive treatment but his condition went downhill and he expired.

Case 3.—Indian Christian, married female, aged 40 years, admitted on 12th July, 1946, with a history of continuous fever and headache for 9 days and passing tarry stools for 2 days. On examination, patient restless, general condition very low. Extremities cold. P/R—134/30, temperature 100°F. Tongue coated and dry. Abdomen soft. Liver and spleen not palpable. No abnormal sounds in the lungs. Heart sounds weak. Soon after admission, passed a stool with altered blood. Laboratory findings: Hb. 45 per cent, red cells 2.5 millions. W.B.C. 6,700. Polymorphs 68 per cent, lymphocytes 30 per cent, large monocytes 2 per cent. No malarial parasites found. Both Widal reaction and blood culture negative. On 13th, temperature became subnormal. Pulse imperceptible. Passed another tarry stool and started vomiting coffee-ground material. Death occurred the same day. Patient developed jaundice before death.

Case 4.—Hindu male, aged 19 years, single, admitted on 23rd June, 1946, for continuous fever and headache for 8 days. On examination, nutrition fair, tongue coated in the centre, edges raw, temperature 103°F. P/R—100/21. Liver and spleen not palpable. Heart—nothing abnormal. Lungs—a few scattered rhonchi. Laboratory findings: Hb. 72 per cent (Hellige). R.B.C. 3.5 million/e.mm. W.B.C. 5,062. Polymorphs 60 per cent, lymphocytes 35 per cent, monocytes 4 per cent, eosinophils 1 per cent. M.P.—not found. Widal para B 1/50.

Temperature continued a typical enteric course till 5th. On 7th, patient had nausea and hiccups. Temperature 99°F. P/R—98/26. Vomiting started. The vomited matter was watery at first, becoming bilious later. On 9th, the patient had a copious vomit, black in colour, occult blood

test in the vomit positive. General condition deteriorated. Temperature 98°F. P/R—110/26. Some purpuric spots appeared on the hands and forearm. Platelet count 250,000 e.mm. Died on 10th July.

Case 5.—An unmarried Hindu male, aged 23 years, was admitted on 25th July, 1946, for fever, headache, cough and vomiting of 4 days' duration. On examination, patient was fairly nourished. Tongue was coated in the centre and raw at the edges. Temperature 102°F. P/R—130/40, liver and spleen not palpable. Heart—N.A.D. Scattered râles in both lungs. Vomit was bilious in character. Laboratory findings: Hb. 70 per cent (Hellige), red cells 4.5 millions, no malarial parasites. W.B.C. 7,500. Polymorphs 65 per cent, lymphocytes 30 per cent, monocytes 4 per cent and eosinophils 1 per cent. Widal reaction was negative. Blood culture positive for *B. typhosum*. No abnormality in urine and stool. Vomiting persisted and on 30th July, 1946, contained streaks of blood. Occult blood test in vomit was positive. Bleeding and coagulation times were 4 minutes and 5 minutes respectively. Vitamin K was started. On 4th August, the temperature dropped to 97°F., P/R—96/32. In spite of this, the condition did not improve much and he now complained of pain in the epigastric region. Jaundice was noticed at this stage. Hæmorrhagic fluid was withdrawn from the stomach by Ryle's tube after which the viscus was washed out with sodium bicarbonate solution in warm normal saline. Prothrombin time determined at this stage was 1 minute 10 seconds (control 25 seconds). Vomiting of thick black fluid continued unabated and the patient died on 5th August.

Case 6.—An unmarried Anglo Indian male, aged 20 years, was admitted on 1st October, 1946, for continuous fever for 17 days. On examination, he was fairly nourished but toxæmic. Tongue coated. Temperature 103°F. P/R—116/30. Liver and spleen not palpable. Heart—N.A.D. Both lungs showed râles at the bases. Laboratory findings: Hb. 80 per cent (Hellige), red cells 4.2 millions. W.B.C. 9,062. Polymorphs 92 per cent, lymphocytes 6 per cent, monocytes 2 per cent, eosinophils nil. No malarial parasites found. Widal reaction T_H 1 in 150 and T_O 1 in 50. No abnormality in urine and stool. The patient ran a high temperature varying between 105°F. and 103°F., his toxæmia increased and on the third day of his admission he had two huge coffee-ground vomits. After this he became pulseless and died in spite of all treatment.

Case 7.—Hindu female child, aged 8 years, was admitted with a history of running a continuous high temperature for 12 days. She had intense headache at the beginning and bowels were constipated. On examination, her general health was fair though moderately anæmic. Tongue coated and moist. Abdomen was distended, the spleen and liver could not be palpated. She looked toxæmic. P/R—136/30

and temperature 105°F. Heart—N.A.D. Both lungs showed scattered râles and rhonchi. Laboratory findings: Hb. 60 per cent (Hellige), red cells 3.5 millions. W.B.C. 20,312. Polymorphs 78 per cent, lymphocytes 18 per cent, monocytes nil and eosinophils 4 per cent. No malarial parasites detected. Widal reaction was negative. A blood culture, however, showed *B. typhosum*. Urine examination revealed definite albumen with a few hyaline but plenty of granular casts. No abnormality in stools. Owing to high leucocytosis the patient was put on an alkaline diaphoretic mixture and adequate doses of M.&B. 693 tablets which were maintained for 5 days. The temperature dropped to 99°F. 8 days after admission, 20 days after the commencement of her illness and 5 days after M.&B. 693 administration.

Although the temperature declined, she still looked toxæmic and pale and her urine diminished in quantity. Two days later, she had a dark-coloured vomit and dark-coloured stool and died on the 11th day after admission.

Case 8.—A young boy of 8 years was admitted on 1st September, 1944, with a history of continuous fever for a week. The onset was insidious and attended with a great deal of headache. He had loose motions for 2 days prior to his admission into the hospital. Examination revealed a fairly well-nourished boy without anæmia or jaundice but definitely toxæmic. His tongue was typical, being coated in the middle and red at the margins. Temperature 102°F., P/R—120/30. Liver and spleen were not palpable. Heart—N.A.D. There were diffuse rhonchi and râles in both lungs. Laboratory findings: Hb. 70 per cent (Hellige), red cells 3.8 millions. W.B.C. 7,812. Polymorphs 60 per cent, lymphocytes 32 per cent, monocytes 8 per cent and eosinophils nil. No malarial parasites detected. Widal reaction negative. Blood culture was positive for *B. typhosum*. No abnormality detected in urine and stool. After running a typical course of a severe typhoid fever during the next 8 days, the temperature came down to normal by lysis and there was an all-round improvement noticeable in the patient's condition. On the 14th day after admission, i.e. after 3 weeks from the beginning of the fever while the temperature fell and the patient improved in every respect, jaundice developed suddenly. Four days later, the boy had two attacks of convulsions in the morning each lasting a few minutes. Then, all of a sudden, he had 3 attacks of coffee-ground vomit, his temperature rose to 104°F., unconsciousness supervened and death occurred in the same afternoon.

Case 9.—A Hindu male, aged 38 years, ran a continuous temperature for 15 days which was typically enteric in course. On the 15th day the temperature touched normal but he developed hiccup. Four days later, he developed œdema over the ankles. He was anæmic but there was no frank jaundice. Liver and spleen

were not palpable and there was no abnormality in the heart and lungs. Laboratory findings: R.B.C. 3 millions. Hb. 50 per cent (Hellige). W.B.C. 3,200. Polymorphs 69 per cent, lymphocytes 25 per cent, monocytes 4 per cent, eosinophils 2 per cent. M.P.—none found. Widal 1/250, blood culture negative. Urine showed a trace of albumin and bile; stool revealed plenty of giardia cysts and gave a positive occult blood test.

The temperature remained normal without much clinical improvement and on the 23rd day of illness he had an attack of hæmatemesis. This was soon followed by another attack of hæmatemesis and melæna and he died on 1st August, 1946.

Case 10.—A Hindu male, aged 30 years, had a continuous temperature for 5 weeks during which period Widal reaction and blood culture were both positive. He was treated as typhoid fever, and for the lung complication which developed during the illness, penicillin was used. The temperature was normal for 3 to 4 days after which it recurred again. Examination revealed a fairly well-nourished patient though he was looking pale and toxæmic. Temperature 104°F., P/R—130/34. No abnormality in the heart and lungs. Liver and spleen were not palpable. There was œdema all over the body with a little fluid in the peritoneal cavity. Widal reaction was positive. Towards the 50th day of his illness as the temperature gradually touched normal, he developed jaundice. Two days later, he got a bout of coffee-ground vomit, passed a tarry stool and in spite of all treatment died 4 days afterwards.

Comment

Typhoid fever being essentially a disease characterized by ulceration in the wall of the gut, hæmorrhage is often met with. The reason is obvious, because in the evolution of a typhoid ulcer, a blood vessel may be eroded. When such an accident occurs, the picture is characteristic, the severity of the symptoms depending on the quantity of blood lost within a given period. It is natural to expect such a bleeding at a time when the sloughs separate and the ulceration extends which events occur usually in the third week of the illness. The extravasated blood passes through the rectum and appears as melæna. There is no chance of this blood going upwards to the stomach to be vomited out. Given necessary treatment in the way of restoring blood volume and giving blood transfusion, patients usually get well and recovery becomes complete. The cases under review did not present any feature to resemble such a bleeding. It may be argued that a hæmorrhagic toxic gastritis may develop in the course of the infectious disease giving rise to the characteristic vomiting. Such a complication, if it develops at all, cannot explain all the details as revealed by our cases. Toxic gastritis should develop at the height of toxæmia and it would be difficult

to invoke such a complication when the course of the disease almost terminates or convalescence sets in. Moreover, jaundice often appears, either preceding or following the hæmatemesis.

It is a common experience of many of us in this country that the diet and dietetics in typhoid fever is very unscientific. The diet is not only deficient in calories, but in most of these cases, it also lacks in proteins, minerals and vitamins. When this defective dietary method is followed for a prolonged period, patients may develop œdema on the dorsum of the feet, puffiness of the face, and ulceration of the lips, angles of the mouth and tongue. It is in these patients that deficiency of other vitamins may make their appearance. Some of the vitamins are intimately connected with the coagulation factor of the blood whilst the other is responsible for the tone and permeability of the capillary wall. In those patients who are kept on such a poor diet, the deficiency of the latter vitamins is likely to manifest symptoms of defective coagulation mechanism of the blood with diminished prothrombin time of the plasma as well as altered permeability of the capillary blood vessels. Thus, hæmorrhagic oozing from the mucous membrane of the stomach and intestine begins which soon comes out as hæmatemesis and melæna. In order to corroborate their ideas, the writers are estimating the prothrombin time as a routine in typhoid fever cases using snake venom method. Cases with prolonged prothrombin time do not necessarily end in hæmorrhage although most of the cases who subsequently developed hæmorrhage had prolonged prothrombin time. Whether this hypoprothrombinæmia may have any rôle to play in the causation of these hæmorrhages is a matter for speculation. More work on this line may throw some light on this problem. The causal relationship of vitamin P with these hæmorrhages is also a matter for consideration. In case no. 4 in our series, there was purpuric hæmorrhage on the skin. It appears therefore that some part is also played by the lack of permeability vitamin in these cases producing an extravasation of blood in the stomach and intestine—a condition resembling symptomatic purpura having developed. More observations on these lines are necessary before any definite conclusion can be reached.

What rôle is played by the liver in these cases cannot be definitely stated. It will be found that many of the cases in this series developed jaundice either before or soon after the hæmatemesis and melæna started. It is known fairly well that in typhoid infection the liver may be variously damaged and focal necrosis and damage to the hepatic organ often take place. The jaundice which appeared in these cases was probably the result of a toxic hepatitis and under such circumstances the liver function may be depressed very much producing low plasma prothrombin and prolongation of the prothrombin time. If such a hypothesis be correct, tendency

to spontaneous bleeding can be easily explained; when the symptoms of hæmatemesis and melæna once start, the condition of the patient deteriorates progressively. The death is usually due to cardiac failure consequent on loss of blood. It will be noticed that none of the cases reported above survived even after transfusion of blood and administration of adequate doses of vitamins.

Summary

1. Ten cases of enteric fever having developed hæmatemesis and melæna as unusual complications are reported.

2. Clinically, jaundice which is known to be a very rare occurrence in typhoid fever developed in these patients either before or after such a hæmorrhage started.

3. Condition of the patients deteriorates progressively and rapidly in spite of all treatment, a fatal termination occurring in 2 to 3 days.

4. A diet with low calories, biological proteins and vitamins is a very important predisposing factor producing amongst other bad effects a deficiency of vitamin K and vitamin P leading to marked changes in the coagulation mechanism of the blood and the tone and permeability of the capillary wall. A severe damage of the liver produced by the enteric fever is perhaps responsible for such a derangement of the coagulation mechanism, the maintenance of which is one of the important functions of the hepatic organ.

The writers are indebted to the Superintendent, Medical College Hospitals, for his permission to publish the records of some of the cases and also to the house physicians for their ungrudging help in the management of some of these desperately ill cases.

INTRAVENOUS PALUDRINE IN MALARIA

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WITH the advent of paludrine which has been reported to be superior to all known anti-malarial drugs, the use of it as a routine measure against malaria was started from July 1947 among the industrial population of the Ludlow Jute Mills which is situated at Changail in the district of Howrah. As usual the incidence of malaria in the place started rising up from the month of July. The population of the mill is about 5,000 and consists of people of Bengal, Bihar, Orissa, U.P., Madras, Ganjam and Bilaspur. Certain sections of the mill labour, particularly those from Madras, U.P. and Bihar, insist on having an injection whenever they are acutely ill from their previous experience with

mepacrine injections. So we thought of utilizing this drug by the parenteral route which has not been hitherto used by any of the previous workers as far as we are aware. To start with the drug was tried by intramuscular route on two cases but, as the patients complained of pain and tenderness at the site of injection as with mepacrine injections, the intravenous route was resorted to.

Preparation of the solution.—Paludrine is soluble in water in a concentration 1 in 50. The solution was made in normal saline in bulk. Five hundred tablets (= 50 grammes) were dissolved in 2,500 c.c. of normal saline. The tablets disintegrated and dissolved quickly with constant stirring. The solution was allowed to remain in a tall jar for 24 hours to allow the binding materials to settle down leaving a clear supernatant fluid which was siphoned off and autoclaved for 30 minutes under 20 lb. pressure.

Enquiries at the Imperial Chemical Industries who are the manufacturers reveal that they have not yet placed in the market any preparation for parenteral use. They have however a preparation under trial.

The class of cases.—All the cases were residents of the company's coolie lines situated within about 800 yards of the mill hospital. The cases were selected after proper clinical or laboratory diagnosis and for facility of observation.

Only 50 cases form the subject-matter of this preliminary report. They were of the following categories :

Group A : Acute malaria cases	32
Group B : Acute relapses of chronic malaria .. .	18
Total ..	50

All patients were adult workers and their ages ranged between 19 and 52 years : 41 were males and 9 were females.

Group A.—Acute malarial fevers—total cases 32.

In this group cases were again selected and subgrouped in the following manner :

(a) Those cases in which fever came on alternate days with or without chill. There were 11 cases in this group—usually a case had his 2nd, 3rd or 4th attack before the treatment was given. The temperature range was from 102 to 105°.

(b) These are cases of first attacks of typical clinical malarial ague. There were 21 cases. There was no enlargement of spleen. The blood films were examined with the following results :

B.T. found in	15 cases.
M.T. found in	3 cases.
No parasites	3 cases.

Temperature range of these cases was from 102 to 105°.

Group B.—Chronic malarial cases with acute relapses. There were 18 cases. All had varying degrees of splenic enlargement and had invariably more than one attack. The temperature range was between 102 and 105°. Many of these were known patients of recurrent malaria.

Technique of treatment by injection.—15 c.c. of the paludrine solution (= 300 mg. of the drug in normal saline) described above were injected into a vein at the bend of the left elbow slowly. For the first few cases lying down for about 10 minutes after the injection was advocated but as these patients did not complain of anything except the needle prick at the site of injection subsequent patients were allowed to go away after a few minutes. In all these 50 cases there was no immediate reaction whatsoever.

Results : Group A.—Of the 32 cases 5 showed persistence of temperature ranging between 100 and 102° on the 2nd day after the injection. These were as follows from subgroups—

(a) Clinically typical cases—2.

(b) Malarial ague cases confirmed by laboratory test—3 (all these were B.T. infection).

In these cases a second intravenous injection of 15 c.c. was given on the 2nd visit next day and they all became afebrile on the 3rd day.

The remaining 27 cases of group A became afebrile on the 2nd day after the injection and were quite fit.

Group B.—Everyone of the cases of this series had become afebrile on the 2nd day of the injection.

Subsequent treatment of all these cases, both groups A and B, consisted of giving them paludrine, 1 tablet three times a day by mouth, until a total dose of 12 tablets was attained and on completion of this course two tablets per week on set days at spaced intervals.

Paludrine by mouth (defective tablet).—The paludrine tablets as marketed at present disintegrate in the air into a powder and on account of this drawback cannot be dispensed the total dose for the full treatment conveniently to labourers at one time. So we dissolved the tablets in water in the same manner as for intravenous use and made up a solution in the strength of 1 tablet per one or half ounce of water flavoured with Aqua. Menth. Pip. and coloured with orange dye. This was dispensed in bottles in the time-honoured paper-marked foolproof style. This solution was taken three times a day and particularly suited those patients who had any degree of chronic trouble of the upper bowels. In other cases where there was no stomach trouble the patients were given 3 tablets to swallow at once, when they came for the 2nd visit. This was repeated on the 3rd and 4th days. In these cases a few doses of an alkali bromide diuretic mixture were given during the day.

After effects of the intravenous injection.—During the treatment with paludrine two

symptoms were reported by some patients namely varying degrees of anorexia and insomnia. Anorexia was reported by 4 patients (8 per cent) while insomnia by 6 per cent. Whether these symptoms had anything to do with intravenous paludrine is very difficult to say. Regarding anorexia it is worth mentioning that a large percentage of the mill hands are suffering from a form of chronic gastritis due to use of adulterated food.

Further experiments using 4 tablets of paludrine in 20 c.c. are being carried out and results will be published on the completion of a large number of cases.

Conclusion.—Paludrine solution can be used intravenously with good results as an anti-malarial agent. This method may well be utilized when the oral administration of the drug is not practicable.

P.S.—These observations were completed by the end of July 1947 and at the time of writing (end of August). The patients have been taking 2 tablets a week and had no relapses so far.

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SEROLOGICAL TECHNIQUE (contd.)

By S. D. S. GREVAL

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DETAILS OF COMPLEMENT-FIXATION IN KALA-AZAR AND LEPROSY

ADDITIONAL APPARATUS: (1) Soxhlet apparatus, (2) sand bath, (3) glycerine bath, (4) condenser, (5) reflux condenser.

ADDITIONAL CHEMICALS: (1) pyridine, (2) glycerine, (3) acetone, (4) benzol, (5) lecithin.

The Technique

The hæmolytic system.—This is taken from the LCF reaction. The complement is preferred in this order: (1) one of optimal titre and reaction, (2) one of high titre and optimal reaction, (3) one of high titre alone, and (4) one of optimal titre alone. *Complement of other qualities is not used.* This linking of the reaction with LCF is important.

The antigen.—The extract for making the antigen is essentially a solution in benzol of the (i) alcohol insoluble, (ii) pyridine soluble, and (iii) acetone insoluble fraction of the human tubercle bacillus. It can be bought as the WKK (Witebsky, Klingenstein and Kuhn) or prepared as follows:—

1. **The culture of the bacillus.**—At least 12 cultures, on glycerine agar, from 6 cases, grown for 2 months, are scraped and used as one lot.

2. **The bacterial mass.**—For the last stock of the extract made by the author 12 tubes and 1 Roux flask were scraped. The scrapings were suspended in 50 c.c. saline and autoclaved for $\frac{1}{2}$ hour. The killed bacilli were collected on double filter paper and dried in a desiccator for 2 days (constant weight not necessary). The weight was 1.078 grammes.

3. **Extraction with alcohol.**—27 c.c. of alcohol (20 times by weight) were added to the dried mass which was extracted with a reflux condenser over a water bath for 3 hours. The bacilli were again collected by filtration and dried in an incubator. The weight of the dried mass was 0.788 gramme. This was the alcohol insoluble fraction.

4. **Extraction with pyridine.**—The dried mass was extracted in a 50 c.c. Soxhlet apparatus with pyridine for 5 hours over a glycerine bath at 130°C. From the pyridinic solution the solvent was removed by distillation over a sand bath. The weight of the dried residue was 0.1652 gramme. This was the alcohol insoluble and pyridine soluble fraction.

5. **Extraction with acetone.**—The residue was extracted with 20 c.c. of acetone with a reflux condenser over a water bath for 3 hours. The acetone solution was filtered off. The residue on the filter was washed with 3 c.c. fresh acetone and dried in an incubator. The weight of the dried mass was 0.076 gramme. This was the alcohol insoluble, pyridine soluble and acetone insoluble fraction.

6. **Solution in benzol.**—The residue was dissolved in 7.5 c.c. of benzol in a small pestle and mortar (total quantity made up after evaporation due to exposure) to give a 1 per cent solution. The solution, unlike the commercial preparation, was milky. 15 c.c. of benzol were added by instalments of 5 c.c. to obtain a clear solution. The further addition of benzol is a departure from the original technique.

7. **Addition of lecithin.**—To two parts of the benzolic solution was added residue from one part of a 1 per cent alcoholic solution of lecithin. This was the desired extract for making the antigen. The antigen made from it agreed with the antigen made from the commercial extract in every way.

The extract keeps indefinitely when stored in a cool and dark place. If stored in a refrigerator it is taken out a day before the test and left at room temperature overnight. If not perfectly clear the next day it is left for half an hour in an incubator at 37°C. The quantity of the extract needed for a day's work, for 12 to 24 tests, need not exceed 0.2 c.c.

A new extract is considered fit for use only when the antigen prepared from it fixes complement with the titrated controls of pooled serum from cases of kala-azar to the limit of their reactions.

For making the antigen, evaporate a small volume of the extract (0.2 c.c.). Make the

residue, free from smell, into a uniform suspension, in pestle and mortar, with saline twice the volume of the original liquid (0.4 c.e.). *This suspension is the starting point.* From it prepare dilutions of 1 in 10, 1 in 20, 1 in 30, 1 in 40, 1 in 50 and 1 in 60 and test for anti-complementary activity with 1 MHD of complement, thus :—

Tube No. :—	1	2	3	4	5
Antigen dilution 1 vol. of 1 in :	20	30	40	50	60
1 vol. of complement containing :	1 MHD	1 MHD	1 MHD	1 MHD	1 MHD
Saline :	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.
Left at room temperature $\frac{1}{2}$ hour and in incubator $\frac{1}{2}$ hour.					
Sensitized rbc suspension :	1 vol.	1 vol.	1 vol.	1 vol.	1 vol.
Left in incubator $\frac{1}{2}$ hour. Result read as +, T, \pm , ? —, and —, immediately.					

The strongest dilution of the antigen permitting an almost complete hæmolysis of the rbc (?—) is the required dilution for the test and one volume of it is the dose : for instance, if the 1 in 50 dilution permits the hæmolysis the dilution for the test should also be 1 in 50 (made from the suspension which is the *starting point*) and one volume of it is to be the dose. As in previous determinations of MHD in the presence of the antigen, the tube showing the hæmolysis should just fall short of the crystal clear and ruby red tube giving the MHD of the complement acting alone. When two tubes are alike choose the one with the stronger dilution.

The dose should not be hæmolytic. Three volumes added to one volume of rbc should not hæmolyse the latter in $\frac{1}{2}$ hour at 37°C.

The strength of the required dilution varies with samples of the extract and lies usually between 1 in 40 and 1 in 60, but may be higher or lower. It is not determined on every day of work but simply confirmed by adding 1 volume of the dilution to 1 MHD of complement and 1 volume of saline, incubating the mixture, and adding 1 volume of sensitized rbc which should be hæmolysed on incubation. It may be determined every two months or so, specially with the change of seasons.

The dose is in excess of the needs of the reaction. With a constant dilution of a constant positive serum the reaction does not weaken with a gradual decrease in the antigen until the dose is halved.

The serum : 1. *Under test.*—It is inactivated at 55 to 66°C. and diluted 1 in 20.

2. *Known positive.*—Six positive sera when available are pooled, filtered and preserved. Titrated positive controls, giving + and T, in a 1 in 100 and a 1 in 200 dilution respectively or in stronger dilutions, are prepared as in the case

of LCF. The preserved serum need not be re-inactivated unless it has turned anticomplementary.

3. *Known negative.*—This should also be available from other tests.

Charging of tubes.—Only two tubes, one for the serum control and one for the test proper, are required and charged.

A column

1st and 2nd row tubes contain serum, 1 in 25, 1 volume and complement 2 MHD contained in 1 volume.

2nd row tube. Antigen dilution, 1 volume.

1st row tube. Saline (no antigen), 1 volume.

(Antigen and complement are mixed and delivered as a double volume after the serum has been delivered.)

Left at room temperature and incubated as in LCF.

Sensitized rbc, 1 volume added.

Incubated $\frac{1}{2}$ hour.

A negative control is put up in the same way.

If an LCF for syphilis is being done on the serum the same day, the serum control may be omitted. The serum control in the LCF test, even if \pm in a 1 in 5 dilution, will serve as a fully hæmolysed tube for this test.

Titrated positive controls, *two tubes for test proper*, are also put up, thus :—

A column

All tubes contain complement 2 MHD contained in 1 volume.

3rd row tube with : Serum 1 in 200, 1 volume. Antigen dilution, 1 volume.

2nd row tube with : Serum 1 in 100, 1 volume. Antigen dilution, 1 volume.

1st row tube with : Serum 1 in 100, 1 volume. Saline (no antigen), 1 volume.

Mixing of antigen and complement, first incubation, addition of sensitized rbc and second incubation as before.

As in the LCF the titrated positive controls indicate the constancy of the reaction from day to day and make small differences comparable. They are not indispensable for an occasional test.

Reading of results.—This is done immediately and next day as in LCF.

Complete inhibition of hæmolysis ..	=	+
A trace of hæmolysis ..	=	T
More than a trace of hæmolysis ..	=	±
Hæmolysis almost complete ..	=	?—
Hæmolysis complete ..	=	—

Record and report, and significance.—With only two tubes record and report are simple procedures :—

Serial number	Tubes		Result	Report
	1st row	2nd row		
I	—	—	—	Negative.
II	—	?—	—	Negative.
III	+	+	Anticomplementary.	Nil. (To be repeated in weaker dilution.)
IV	+/T	+	Anticomplementary.	Nil. (To be repeated in weaker dilution.)
V	—	+	+	Positive.
VI	—	T	±	} Doubtful.
VII	—	±	±	

Anticomplementary sera in kala-azar are frequent and their anticomplementary titre is the highest anticomplementary titre known to the author. Dilution, as in complement-fixation in general, reduces this titre much more rapidly than the antibody (or reagin) titre.

The significance of + and — is equal and high in kala-azar. A negative reaction in a case of fever of over two weeks' duration is not compatible with kala-azar. A positive reaction is given only by: (1) kala-azar, (2) leprosy, (3) some cases of dermal leishmaniasis, and (4) some cases of pulmonary tuberculosis. The last two conditions can be excluded easily, clinically.

The significance is also high in nodular leprosy. It has been said that cases of this type of leprosy do not require much aid in diagnosis beyond a microscopic examination of the lesion. Taking blood, however, is a much easier process than removing bits of the body for the microscope. Besides, a determination of the end-point of the reaction is capable of measuring improvement, spontaneous or resulting from treatment.

The aid given by the test in neural leprosy is not of a high order.

Testing weaker or stronger dilutions.—The 1 in 25 serum dilution was arrived at by selection from a large range of dilutions. In this dilution only the two diseases mentioned above may sometime interfere. They are excluded serologically by testing a 1 in 100 dilution. As a

matter of fact, it saves time in the end if one uses two dilutions for the test always, thus :—

A column

All tubes contain complement 2 MHD contained in 1 volume.

3rd row Serum, 1 in 100, 1 volume.
tube with : Antigen dilution, 1 volume.

2nd row Serum, 1 in 25, 1 volume.
tube with : Antigen dilution, 1 volume.

1st row Serum, 1 in 25, 1 volume.
tube with : Saline (no antigen), 1 volume.

Other procedures as before.

Only a + in the 3rd or 2nd tube is accepted as a positive reaction. If both tubes are positive the reaction is 'Positive, strongly'.

Stronger dilutions (1 in 5 and 1 in 10) are employed after the failure of the standard 1 in 25 dilution in early stages of kala-azar and in nerve leprosy, and for observing improvement in nodular leprosy and kala-azar, thus :—

A column

All tubes contain complement 2 MHD in 1 volume.

3rd row Serum 1 in 10, 1 volume.
tube with : Antigen dilution, 1 volume.

2nd row Serum 1 in 5, 1 volume.
tube with : Antigen dilution, 1 volume.

1st row Serum 1 in 5, 1 volume.
tube with : Saline (no antigen), 1 volume.

Only a + in the 3rd or 2nd tube is accepted as a positive reaction which is reported 'Positive in 1 in 10' or 'Positive in 1 in 5'.

Paradoxical reaction.—This is seen occasionally and usually in the strong dilutions of a strong serum. Attention is called to it when the stronger of the two dilutions give a weaker reaction, as below :—

A column

3rd row tube with : Serum 1 in 10 Reaction T

2nd row tube with : Serum 1 in 5 ±

1st row tube with : Serum 1 in 5 (and no antigen) —

The reaction would be called doubtful but for the paradox. On diluting the serum further a + reaction is obtained.

In view of such a possibility it would be wise to test all sera in two dilutions always.

Two doses of complement versus 2 dilutions of serum.—That a differentiation between + and T, towards the end-point of the reaction of positive serum in the LCF in syphilis, can be made more often with a decrease in serum than an increase in complement is established by the titrated positive controls in that reaction, thus :—

Tubes :	1st	2nd	3rd	4th
Serum dilution :	1 in 50	1 in 100	1 in 50	1 in 100
Antigen :	1 vol.	1 vol.	1 vol.	1 vol.
Free complement :	2 MHD	2 MHD	4 MHD	4 MHD
Reaction :	+	T	+/T	T/±

Arithmetically the fixation in the 3rd tube should equal to that in the 2nd tube. Actually it is always more even when incomplete. The 3rd tube should yield a T reaction but as often as not it yields a + reaction. The 2nd tube in which the serum has been decreased is more reliable as a control and in keeping with expectation than the 3rd tube in which the complement has been increased.

In a strong reaction if a differentiation between two tubes can be made it should be made.—Such a differentiation probably not of much importance in establishing a diagnosis is invaluable in observing improvement.

Observations on the Technique

The sensitiveness of the reaction.—The sensitiveness is of a very high order. Like the strongly positive LCF of secondary syphilis the reaction cannot be missed or masked by any error or irregularity which is likely to creep into a serological procedure. Because of this high degree of sensitiveness T is not considered better than \pm . For the same reason ?—is grouped with —.

The specificity of the reaction.—While there is ample excuse for using the term specificity in connection with the reaction of the sera of lepers with the antigen, because of the group relationship between *M. tuberculosis* and *M. lepræ*, the use of the term in connection with the sera of kala-azar patients is not justified. In the latter case the reaction is undoubtedly non-specific like the LCF reaction in syphilis and has probably a similar immunological basis: a reagin arising from processes of allergy (not an antibody arising from processes of immunity) happens to fit into an antigen-like substance and needs the aid of complement for the completion of the process. The diagnostic aid, however, is of a very high order, comparable to that given by the LCF in secondary syphilis.

Special features of the technique.—There are five such features: (1) the antigen is linked to the MHD of the complement, its dose being the

maximal non-anticomplementary amount. (2) The serum is tested routinely in a dilution of 1 in 25. In this dilution interference caused by other diseases is minimal. (3) The dose of the complement is small and constant. Difference in reaction is brought out by increasing or decreasing the serum. This plan (i) detects paradoxical reactions and (ii) differentiates between + and T better than an increase in complement. (4) Complement of a poor quality, as determined in its titration in the LCF for syphilis, is not used. This restriction on the complement ensures obtaining of repeatable results in weak reactions. (5) Titrated positive controls are used, when available.

Repetition of the Reaction

For technical reasons: 1. *When the titrated controls are available.*—Their correct reaction guarantees the correctness of a \pm reaction which need not be repeated.

2. *When the titrated controls are not available.*—From what has been said concerning the preference for the qualities of the complement, it follows that a doubtful reaction not in accordance with clinical expectation or not giving enough aid in diagnosis should be repeated with a complement of a better quality (if an inferior quality has been used before) in order to obtain more fixation. This is necessary in view of the fact that adjustment like those in the LCF are not made in this reaction.

The repetition is also indicated when the MHD of the complement selected for the LCF has given a fixation rather on the low side in that reaction.

Enough serum should be available for the repetition from the original sample. If a fresh sample be necessary the preparatory measure of taking the blood early in the morning, before any food has been taken—if ignored previously, should be enforced now.

For observing the course of the disease.—Fresh samples will, of course, be necessary for observing increasing or decreasing fixations.

(To be continued)

A Mirror of Hospital Practice

A CASE OF HERNIA LUNG

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HERNIA of the lung is rare, so the following case deserves publication.

G. C. P., cultivator, aged 35, Hindu male, was admitted to my ward with a painful visible swelling on coughing over left anterior chest of four months' duration.

The patient stated that he was gored by a bull over that part about five months ago. Immediately after the injury he noticed a local swelling. He was febrile for about a week. The local swelling subsided in a month's time, followed by the present swelling. There was no history of hæmoptysis after the injury.

On examination.—There was an oval swelling about three inches long with its long axis horizontal, visible on coughing over the left third and fourth intercostal spaces in front (see figure 1, plate XXVII). During quiet breathing

there was a depression over the area, and the swelling would reappear on forced expiration. The swelling was crepitant and reducible. A small gap could be felt through the third intercostal space near costochondral junction. On pressing the gap and then asking the patient to cough, the swelling would not appear. On auscultation vesicular breathing could be heard over the swelling. X-ray examination of chest did not throw any light on the lesion apart from the fact that there was displacement of the third costochondral junction. Under intratracheal gas oxygen and ether anaesthesia the swelling was explored. The pectoral muscles were split when the hernial sac was exposed. The pleural sac was adherent to the overlying muscle and was accidentally opened while freeing adhesions. The neck of the sac was about two inches wide. There was no adhesion between visceral and parietal pleura. When the pleura was opened, positive pressure anaesthesia was used. The neck of the sac was closed with interrupted catgut stitches. The gap in the chest wall was closed by transplanting the lower rib by breaking it in the middle and raising the anterior end. The anterior end of the transplanted rib was fixed by two catgut stitches passed through drill holes to the periosteum of the rib above (see figure 2, x-ray photograph, plate XXVII). The wound was closed in layers.

The operated area was strapped for three weeks. Recovery was uneventful. The case was followed for about two months. There was no recurrence. Patient complained of dragging pain over the site of operation during extreme abduction of the left shoulder.

Comment.—Hernia of the lung or pneumocele is a bulging of lung tissue through a deficiency of chest wall during expiration. The bulging is either through an intercostal space or through a gap between the broken ends of a rib over the front and lateral aspect of chest. It may be

congenital or acquired in origin. If acquired it may be spontaneous in old emphysematous patients or after an injury.

Clinically it is usually reducible, but it may be irreducible if there is adhesion between visceral and parietal pleura at the neck. If the bulge takes place in inspiration it means diaphragmatic injury. Strangulation is very rare.

The swelling may be confused with cold abscess, angioma, empyema necessitatis, lipoma or diaphragmatic hernia with protrusion of abdominal viscera. If there is doubt x-ray examination after A.P. may be of value in diagnosis. Treatment may be conservative with a truss in old patients. When operation is decided closure of the chest wall is the important part of the operation. One should avoid opening the sac for chance of late adhesions. This patient was complaining of pain at the site of operation, probably due to adhesion. Closure of the wall over the gap may be done by reflecting pieces of periosteum, fascia lata strips or by transposition of ribs without complete resection. The results of these operations are usually satisfactory. This patient experienced some dragging pain during extreme abduction of the shoulder probably due to fibrosis in the pectoral muscles which will ease out in due course of time.

I am grateful to Major E. A. Lossing, M.D., I.M.S., for allowing me to report this case.

This case was demonstrated in a clinical meeting at the School of Tropical Medicine, Calcutta.

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Therapeutic Notes

NOTES ON SOME REMEDIES

XIV.—DRUGS IN SYPHILIS (contd.)

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CLINICAL USES

I. Early syphilis

THE modern treatment of syphilis by arsenic, bismuth and penicillin is followed by very favourable results, provided that it is commenced in the early stage and maintained regularly. Any delay renders cure less likely. It is, therefore, of the utmost importance to

establish the diagnosis before the patient becomes Wassermann positive, and this can only be done with certainty by finding *Treponema pallidum* in the serum expressed from the primary lesions. Of the arsenicals neoarsphenamine (NAB) or mapharside should be relied on and the others are to be used only in special circumstances, but short courses as given in the old days are useless. Three or four courses of half a gramme of NAB per stone body-weight are a fair average—that is, a ten-stone man requires about five grammes in each course. But we cannot depend on arsenicals alone, they must be reinforced with bismuth which also has to be given in long courses. We must remember, too, the importance of persisting with treatment for the



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.



Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.



Fig. 11.



Fig. 12.



Fig. 13.



Fig. 14.



Fig. 15.



Fig. 16.



Fig. 17.



Fig. 18.



Fig. 19.



Fig. 20.



Fig. 21.



Fig. 22.

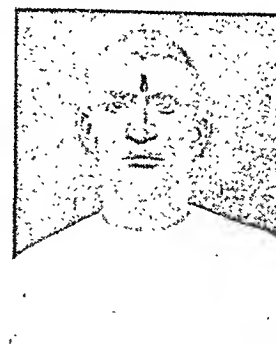


Fig. 23.



Fig. 1.



Fig. 2.



Fig. 3.



Fig. 4.

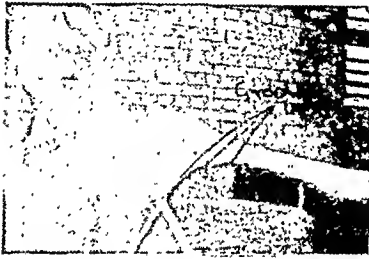


Fig. 5.



Fig. 6.



Fig. 7.



Fig. 8.



Fig. 9.



Fig. 10.



Fig. 11.



Fig. 12.

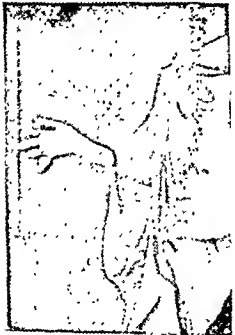


Fig. 13.

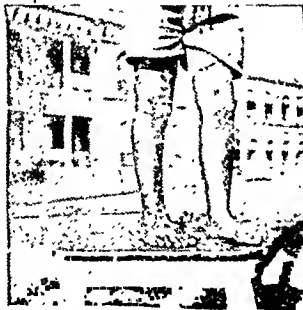


Fig. 14.



Fig. 15.



Fig. 16.



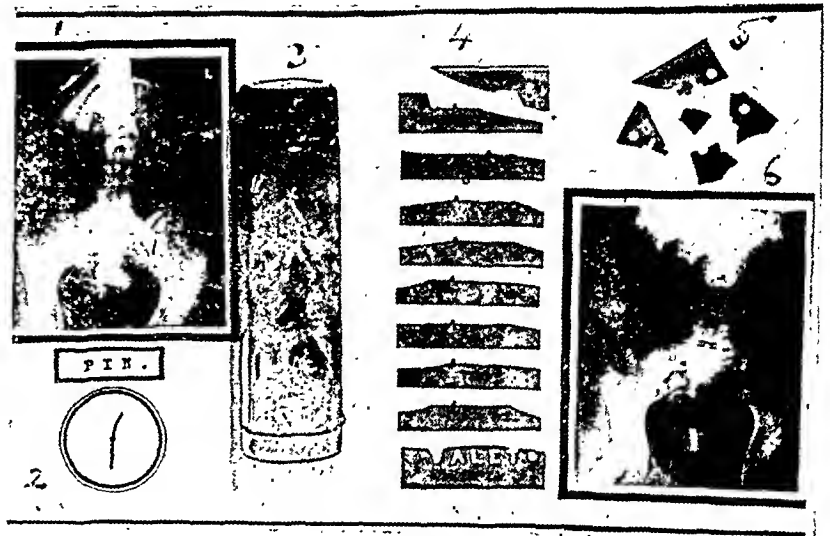
Fig. 17.



Fig. 1.—Showing the papules coalesced in front of the knee joint.



Fig. 2.—Eruption on the sides of the finger and web between the fingers and in front of the knee joint.



Figs. 1 to 6.



Fig. 7.



Fig. 3.—Photomicrograph—mag. $\times 40$. Section stained with sudan III. Fat granules and globules scattered all over the corium.



Fig. 1.—Showing bulging of the chest wall.



Fig. 2.—The arrow mark shows the transplanted rib with early bone formation.

standard period even though serological negativity has been obtained quite early. Treatment is, therefore, a lengthy process, extending over a year even when it is begun in the sero-negative primary stage. This is the greatest obstacle to treatment as many patients fail to co-operate. Owing to this reason there have arisen short-intensive methods of treatment which seem to give good results though it is too early to anticipate their remote effects.

(a) *Intensive treatment with mapharside*

NAB is not used owing to the frequency of toxic symptoms. The dose of mapharside varies according to weight, being approximately 1 mg. per kg. body-weight or 60 mg. (0.06 gm.) for an average man. It is suitable only for early cases and the patients should be young and free from visceral disease or dermatitis. If severe toxic symptoms develop the course must be interrupted and less intensive methods adopted. The most serious complications are agranulocytosis and hæmorrhagic encephalitis. The treatment demands frequent examination of urine and white cell count.

1. *20-day treatment*

Injections of mapharside daily for 20 days and of bismuth on alternate days for ten days. As there is much greater risk of toxic effects than in other methods, the technique should only be employed where skilled supervision and nursing are available.

2. *10-week treatment*

Mapharside three times and bismuth once a week. This is much less toxic and can be used in ambulant cases.

(b) *Semi-intensive 26-week treatment*

It is known as *alternating continuous treatment* in which mapharside (0.06 gm.) and bismuth (0.2 gm.) are given alternately but without any rest intervals. It is now used in the U.S. Army and Navy. It consists of (1) 10 weeks of biweekly mapharside injections followed by (2) 6 weekly injections of bismuth and then (3) another course of mapharside for 10 weeks and in addition (4) weekly bismuth during the first five and last five weeks of the period of treatment (26 weeks).

(c) *Conservative standard treatment*

This is the *intermittent and concurrent* system commonly used in England in which NAB (0.6 gm.) and bismuth (0.2 gm.) are given concurrently by weekly injections for ten weeks followed by four weeks' rest. As a matter of convenience bismuth may be administered a few days after arsenic. Four such series of injections are given to sero-negative cases and five series to sero-positive cases of early syphilis. The total course extends from 52 to 66 weeks

but may have to be varied according to the age and sex of the patient.

In the U.S.A. it is customary to give *alternating continuous treatment*. One such schedule consists of five courses each of arsenic and bismuth. Each arsenic course consists of eight weekly injections and is followed by one of bismuth, the first bismuth course consisting of four injections, the second of six, the third of eight and the fourth and fifth of ten each, the whole treatment being completed in 78 weeks. If mapharside is used the injections should be given twice weekly.

(d) *Treatment with penicillin*

According to one treatment schedule which has been used extensively, the total dosage is 2,400,000 units given in 60 doses of 40,000 units each dissolved in 2 c.c. sterile saline. It is injected intramuscularly every three hours day and night so that the course is complete in seven and a half days. As a significant proportion of cases so treated have relapsed, other methods are being tried, and one of them is the use of 4 to 5 million units of penicillin given over the same period and combined with arsenic and bismuth. This combination has proved superior to penicillin alone. One schedule of this combined treatment is the usual dosage of penicillin followed by ten weekly injections of arsenic and bismuth. Another scheme now under investigation consists of mapharside 0.04 gm. injected once daily for four days, followed by penicillin beginning on the fifth day. Treatment is concluded with bismuth subsalicylate 0.1 gm. given every fifth day for ten doses. It seems that as an adjuvant bismuth is more important than arsenic. Some cases after the first day of treatment with penicillin show the Herxheimer reaction with fever and exacerbation of local lesions; this is a transitory phenomenon and is ordinarily no indication for discontinuing the treatment. Apart from this, the drug produces none of the severe toxic reactions formerly associated with antisyphilitic treatment.

Choice of remedies

The old standard treatment with NAB and bismuth covering a year or more is safe, ambulatory, and with few exceptions applicable to all stages of syphilis, but many patients default owing to its long duration. The toxicity of the intensive methods is inversely proportional to the time in which they are given, i.e. the shorter the intervals of injection the greater the chance of poisoning the patient who in such cases must undergo the treatment in hospital under skilled supervision. Indeed, the intensive methods should be adopted only by those with some previous experience. The short-term results of the 26-week treatment have been reported to be very good and may replace the old conservative treatment, but the intensive and semi-intensive treatments should not be

applied to late syphilis or latent and congenital cases. It seems, however, certain that penicillin will ultimately prove to be the drug of choice in combination with arsenic and bismuth, but we must await the results of the investigations that are now proceeding. It is very likely that longer experience will produce some simplification of present methods of administering penicillin. The various methods are tabulated below :—

Drug	Total dose	Duration of treatment	Remarks
1. Penicillin	2.4 mega units	7½ days	Safe. Dose not satisfactorily settled yet. Should be combined with arsenic and bismuth.
2. Mapharside and Bismuth	1.2-1.6 gm. 2.0 gm.	20 days	Danger of toxic effects. Hospitalization.
3. Mapharside and Bismuth	1.8-2.4 gm. 2.0 gm.	10 weeks	Much safer than no. 2.
4. Mapharside and Bismuth	2.4 gm. 3.2 gm.	26 weeks	Safe.
5. NAB and Bismuth	20-24 gm. 8 gm.	52 weeks	Safe. Can be given in all stages of syphilis. Risk of default.

After care

When early syphilis is adequately treated the Wassermann reaction returns to normal in the vast majority of cases, but it is essential to maintain regular clinical and serological observations for a period of two years. The Ministry of Health, London (Memo., V, 21, 1944) recommends the following procedure: 'After completion of treatment the blood should be tested every three months for the first year and every six months in the second one. After each visit a thorough clinical examination should be made. The spinal fluid should be tested at the end of treatment, or earlier if the blood reactions are resistant and the test should be repeated at the end of the two years of observation which are regarded as minimal. In the case of females, satisfaction of the above tests is not considered to be a sufficient safeguard against infection of the foetus in the event of pregnancy, and treatment throughout the period of gestation should be advised'.

Sero-resistant cases

When all tests become negative and remain so for two years the patient may be considered to be cured. The Wassermann reaction is a good guide to treatment, but there are difficulties in interpreting results and in cases of doubt a

specialist should be consulted. A few cases are sero-resistant when the treatment may be repeated preceded by fever therapy. This may be induced by intravenous injection of mixed typhoid vaccine (T.A.B.) beginning with 25 million organisms and working up to 100 millions or more, at intervals of five days. Malaria therapy or a hypertherm apparatus is superior but not suitable for general practitioners. Some advise a change of drugs, but penicillin has not proved very effective in such cases. When however it is used it should be given in conjunction with bismuth. Too much importance should not be attached to positive Wassermann as long as the spinal-fluid is negative and there is no clinical relapse. Some of these reactions spontaneously disappear with longer periods of observation. Finally, it is essential in all such cases to carry out quantitative serological tests as such an estimation may reveal a greater improvement than is apparent from a qualitative test alone.

II. Late or tertiary syphilis

In tertiary syphilis there is no uniform clinical picture and the treatment is influenced by many factors such as age of the patient, state of heart, liver and other vital organs, and tolerance to antisyphilitic drugs. In these late cases complete eradication is probably impossible and much harm may be done by injudicious energetic treatment. In general treatment should be mild in intensity but prolonged and intermittent and the general health of the patient should be the principal guide and not the result of the serological test. One should begin with iodides which are of great value especially in gummata. NAB is given only after preliminary iodide therapy, but it is important to begin with small doses and not to exceed moderate amounts. The patient should be under treatment for four years and under observation for a longer period. During the first two years he receives every three months a course of arsenic and bismuth and iodides between these courses, and during the next two years courses of mercury and iodides thrice a year or of bismuth twice a year. When arsenic is considered unsafe as it may be in some elderly patients bismuth and mercury may be relied on. Intravenous injections of arsenic should not be given to patients over 60 years old.

A pregnant woman should be energetically treated when the health of the child is the main consideration.

Patients with liver disease tolerate arsenical drugs poorly and are first treated with iodides and bismuth for three months and then with arsenic of which not more than two courses should be given in a year. Cases of renal disease are started with iodides, then small doses of an arsenical drug and as recovery proceeds moderate doses of bismuth preparations are given. Use of penicillin in late syphilis has been referred to in the previous article.

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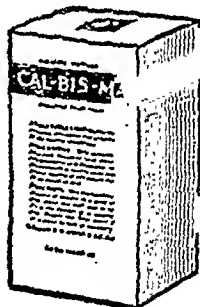
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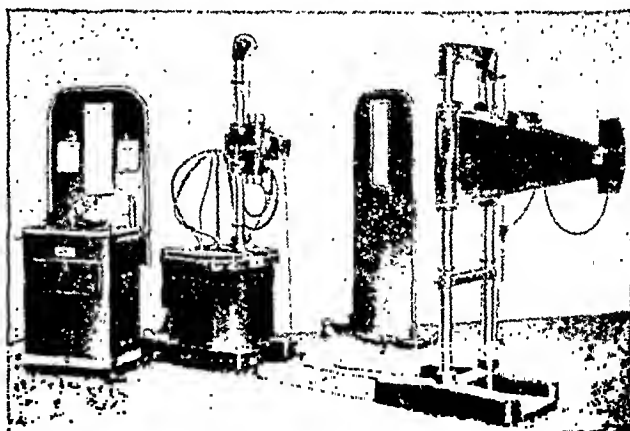
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Indian Medical Gazette

NOVEMBER

STREPTOMYCIN

THIS antibiotic has recently been available in India and has been free from extraordinary restrictions one could have imagined to have been imposed on its delivery from well-guarded stocks. A Calcutta firm, now out of stock, supplied all *bona fide* customers. The usual permits were obtained from the head of the medical department in the province. The Haffkine Institute, Bombay, had supplies sent direct from America.

A Calcutta practitioner of repute has used the antibiotic in three cases of tuberculous meningitis and feels 'neither satisfied nor dissatisfied'. With the pre-streptomycin line of treatment he would have felt dissatisfied undoubtedly. Tuberculous meningitis is the disease which has first claim on streptomycin.

The usual non-committal, if not actually pessimistic, remarks have lately given place to words of encouragement in America. 'In a case of tuberculous meningitis associated with miliary tuberculosis complete clinical arrest followed a long and intensive course of streptomycin therapy. The drug was well tolerated and there were no neurologic residua' (Appelbaum and Halkin, 1947). 'Streptomycin administered early in the course of tuberculous meningitis is capable of arresting the process' (Mehas and Truat, 1947).

The substance is an antibacterial agent produced by the mould actinomycete, *Streptomyces (Actinomyces) griseus*. It was first isolated and reported by Waksman three years ago (Waksman, 1944). Occurring as a base (in contrast with penicillin which occurs as an acid) it is converted into a salt, sulphate* or hydrochloride. The salt is a white powder stabler than penicillin and its solution can be sterilized by heat (Wilson, 1947). It lends itself to be referred to in terms of weight better than penicillin. One gramme of pure streptomycin base equals 1,000,000 units and one microgramme, therefore, equals 1 unit (Editorial, 1947a).

The antibiotic activity of the salt is assayed in a manner similar to that of penicillin. The original unit was defined as the quantity which completely inhibited the growth of a strain of *Escherichia coli* (*Bacillus coli* of the easier nomenclature) in 1 c.c. of nutrient broth.

The antibiotic activity is shown against a variety of gram-negative and gram-positive bacteria both *in vitro* and *in vivo*. The list

includes *Escherichia coli*, *Proteus vulgaris*, *Aerobacter arogenes*, streptococci, staphylococci, Friedländer's group of bacilli, *Pasteurella tularensis*, *Brucella abortus*, *Eberthella typhosa*, *Mycobacterium tuberculosis*, *Hamophilus influenzae* and the last but not the least *Pasteurella pestis*. The effective concentration of the drug in the blood can be maintained by 4-hourly (probably even 8-hourly—Wilson, loc. cit.) intramuscular injections. It also lends itself to other forms of administration like penicillin.

The action on *Pasteurella pestis* is of special interest to us in India. Experimental animals have been saved with certainty and serious human cases of plague have recovered (Sokhey, 1947, personal communication; Karamchandani and Rao, 1948). The rapidity with which improvement sets in, specially in animals, has not been seen before under any other line of treatment. The human case requires altogether 6 grammes of the drug ($1\frac{1}{3}$ gramme every 4 hours) and the cost at present is 2 dollars a gramme. In its claim on the drug plague comes a good second, the pneumonic form of it being bracketed with tuberculous meningitis. The price is bound to come down and thanks to the stability of the compound may be some day as low as that of penicillin.

Reports on the use of streptomycin in tuberculosis were summarized some time ago (Editorial, 1947b). Half the cases of tuberculous meningitis are saved from death and cases of pulmonary tuberculosis are benefited. The former category, unfortunately, may include the blind, the deaf or those otherwise seriously affected by damage to a part of the brain. In this connection it has been suggested that the physician should not wait for all the signs of tuberculous meningitis for a diagnosis. The brain damage then would be slight.

Other tuberculous affections such as cold abscesses, sinuses, urogenital tuberculosis and bone disease have been treated with the antibiotic successfully (Brook, 1947).

Urinary infections not controlled with sulphonamides and penicillin have been controlled with streptomycin.

Experimental syphilis in rabbits (Johnson and Adcock, 1947), and penicillin resistant and sulphonamide resistant, specific and non-specific urethritis (Pulaski, 1947) have also been treated successfully with streptomycin.

Ocular infections of all kinds have also been treated successfully by local application and injection (Bellows and Farmer, 1947).

Not much is known of the action of the antibiotic in whooping cough and leprosy. By all calculations it should act.

In spite of absence of encouraging reports the antibiotic may be used in empyema (even tuberculous), peritonitis and cholera, or any infection with gram-negative organism. In fact, in view of its low toxicity, all forms of acute infections may be treated with it, in addition to the usual treatment.

* Streptomycin sulphate Squibb is supplied in 25 c.c. vials in an amount equivalent to 500 mg. of the pure streptomycin base.

In two respects the drug differs from penicillin markedly: (1) It exerts a selective toxic action on the 8th cranial nerve causing tinnitus and/or vertigo. This is likely to occur and in fact does occur in the treatment of meningitis when the drug is used for months. For other conditions the toxic action does not come into play. The tinnitus and vertigo are not permanent. (2) The micro-organism under attack is likely to become resistant to the drug if the dosage is inadequate. Such an effect caused difficulties in the early days of penicillin too. The difficulties disappeared with the greater availability of that drug. The tendency is definitely greater in the case of streptomycin. The interference, however, is only academic and can be overcome easily except in the treatment of tuberculous meningitis.

Since writing the above, we are informed that the drug has again become freely available in Calcutta. Streptomycin sulphate Upjohn is supplied in vials containing the equivalent of 1 gm. (1,000 mg.) of the pure base.

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Special Article

CORNEAL GRAFTING IN INDIA : ITS DIFFICULTIES

By VICTOR C. RAMBO, M.D., F.A.C.S.

Christian Hospital, Mungeli, C.P., India

THROUGH many years attempts, mostly unsuccessful, have been made to give sight by grafting corneas. Filatov of Odessa (1935) was the first ophthalmologist to report doing considerable successful corneal grafting and to establish it as a practical procedure. Other reports of work followed: Thomas of Cardiff (1938) conducted many experiments and made the procedure a not unusual one in Britain. Castroviejo of New York (1941) was a contemporary and others have taken up the work until it is now often a successful operation, if all of the rules of the procedure are carefully followed, an operation that has helped hundreds of people to better sight.

Corneal grafting is an operation which aims to replace opaque or malformed (as keratoconus) cornea with normal cornea from another eye. Tudor Thomas's investigations have proved definitely that corneal grafting must be done from an eye of the same species. He has proved that heterogenous grafts, i.e. grafts from donors of other species than the recipients, are worthless. Corneas from eyes enucleated for other eye diseases not involving the cornea or eyes from a person who has recently died or even from an infant dying at birth can be used. After removal from the body the eye must be kept at a temperature of 2°C. until use. It is best not to keep the graft more than 48 hours after death and it is better to use it as soon as possible.

My experience in India with the operation has been one of desire and not of accomplishment, and I have not had complete conviction concerning its use except in well-chosen cases.

In the late thirties I was treating a youth with interstitial keratitis from congenital syphilis. A happy result followed. We brought him with specific and fever therapy produced by intravenous typhoid-paratyphoid vaccine from a visual power of counting fingers only at half a metre to the point of successfully completing his college matriculation with 6/6 vision with his refractive correction. During this time I saw in one clinic in a like opacity from interstitial keratitis, a neat central corneal graft with the patient seeing through the graft enabling her to get around independently. A beautiful immediate result. To the distress of the surgeon the newspapers made much of it. A recent visit to the same city now shows that the interstitial keratitis has entirely cleared up from the cornea surrounding the graft and the only opacity is now the central graft which is white, round and exactly demarcated.

During my 1936-37 furlough I talked with Castroviejo and saw some of his square grafts made with his special two-bladed knife. He emphasized, whether knife or trephine was used, the importance of care in choosing a recipient eye for grafting. If there are blood vessels running into the opacity, or secondary infections in the conjunctiva or cornea, or anterior synechia, or glaucoma, or too much scar, one cannot expect success. The corneal tissue of the host, he went on to say, must be sufficient to support the corneal tissue of the graft.

What a battery of demands from a villager who comes in with opacity and demands immediate operation. In my experience it appears that nearly every scar of the cornea has blood vessels to nourish it. The healthy uninjured cornea has a circulation without blood cells, but scar tissue is different. Nearly any scar that is deep enough to disallow peeling off of the scar surgically will have blood vessels running into it, and these can be seen if they are looked for with a loupe, to say nothing of looking for them with the slit lamp microscope.

Somerset of Calcutta points out that the 'majority of opaque corneas in India are due to leucoma adherens. If it is a small leucoma adherens, I think that optical iridectomy is the operation of choice. Where there is a really large leucoma adherens and no clear cornea for an iridectomy you will usually find there is hardly any anterior chamber and no anterior chamber in the centre. Furthermore, in this case the lens is cataractous and largely absorbed. The result is that on drilling out your disk of opaque cornea you go straight on to the vitreous, and in my experience these cases never do much good. However, there are enough cases in which the eye is normal, except for an opaque cornea to make it well worth while doing the corneal grafting operation. In those cases in which one eye is normal, it seems to me that the majority of patients will not get much benefit from a graft on the other eye, because I think the percentage of grafts that remain transparent are very few. We do the operation although there are many difficulties. It is extremely difficult to get donors. We usually take the recipients into hospital and make them wait until a suitable donor turns up and consequently they sometimes have to wait for months'.

I feel that ordinarily it is not fair to the patient to do a corneal grafting operation on an only eye that can be helped into the sighted world with an iridectomy. And the eye that cannot be helped with an iridectomy because of extensive scarring is one that has substantial blood vessels coming in from the limbus, from one or more directions and insufficient corneal tissue to support the new corneal tissue of the graft. Well-directed use of radium may extend the possibility of corneal grafting by making scarred corneas not fit for corneal grafting into corneas where the grafting may be feasible. Lane (1931) 'advocates its use in the treatment of corneal ulcers and claims that it stimulates healing and lessens scar formation through its action on the new-formed connective tissue cells, which are more sensitive than the corneal cells'. Kilgore continuing, 'Radium was recommended as a means of inhibiting the formation of fibrous and vascular tissue by Lane (1931) and Hilgartner and Hilgartner (1933), both in 1931. Iliff uses contact therapy on the invading vessels at the limbus, four to five gram seconds of Beta and Gamma radiation if they are large, and a spray therapy if the vessels are fine and superficial. This consists of passing the application back and forth over the area, giving ten to twelve gram seconds at one treatment repeated within a week. The newly peeled cornea is not exposed to radiation'.

One day a youth of 17 years appeared with a one-eyed corneal opacity ideal for a graft. Though there were a few small vessels going into the scar, I could not imagine finding a scar with fewer or smaller vessels. For three weeks we waited for a donor eye. The youth slipped

away without even the iridectomy that would have helped him a little.

This spring a painful aphakic blind eye with a reasonably good cornea for grafting presented itself in the possession of a fairly well-to-do woman who demanded relief from the pain in that eye. We put off enucleation, and for a week we looked at every person with opacity as a possibility for receiving a graft from the cornea of this eye to be removed. Finally, the woman would wait no longer and with regret we took the eye out and put it into the refrigerator hoping that the next forty-eight hours would bring in a recipient eye. But after forty-eight hours, the eye was turned over to the pathologist. We did not want to wait the full seventy-two hours, some say it is possible to wait, before using the cornea, but even seventy-two hours brought no recipient eye.

On the train to Kodaikanal just a few days ago I met a man from the police force who had read about the corneal grafting in other countries and asked whether I was doing the operation or not. 'It is wonderful, wonderful!' he said, 'It captures the imagination'. And it does. 'Where can I get donors?' I asked. 'So few people with blind eyes, eyes that are useless and even dangerous to leave in, are willing to be donors. They defeat every effort of reason or persuasion'. 'Perhaps eyes of those executed in prisons could be used,' suggested the police official. 'But', he went on, 'usually the relatives take the body'. And that seemingly put an end to that possibility.

I have returned from America with a 5-mm. and a 6-mm. trephines for the cornea graft operation. The parallel knives of Castroviejo are less used than previously, being replaced by the less technically difficult trephines. In skilled hands, on suitable eyes, given suitable grafts, the percentage of useful takes is fairly high. We are ready to use the method to restore sight, we hope soon.

In recent years an eye bank has been developed in several places. This is an organization which canvasses the public and finds donor eyes to give to those doctors who are doing the corneal grafting operation. A good many people have written into their wills a clause which states that when they die their eyes may be used for the corneal grafting procedure.

Can we have an Eye Bank for Sight Restoration such as the one established in New York City? At first only twenty ophthalmologists acted as advisers and interpreters on the programme. Now two hundred and thirty-seven doctors are serving throughout the nation. Instead of the twenty-two hospitals participating there are now seventy-eight hospitals taking a part in the programme. Quoting further from an Editorial on the Eye Bank (1946) 'Transportation for incoming and outgoing eye material has been made available through the co-operation of the American Red Cross and various

airlines. In addition to supplying corneas for surgical procedures, the eye bank has carried on a widespread programme of education both of the public and of physicians through the press, magazines, the radio and the distribution of literature'. Concluding the Editorial states: 'Challenging research problems which have been attacked include studies of corneal preservation, technique of transplanting the vitreous humour and investigation of the metabolic and histologic properties of the eye. An information kit of educational material may be obtained by writing to the Eye Bank for Sight Restoration, Inc., 210 East 64th Street, New York. 21.

If all men and women, officials and public, knew the need, eyes could be made available in India. Some persons would, as in other countries, put a clause in their wills that after death their eyes are to be used to give sight. The press can help greatly in this matter but particularly an organization modelled on the Eye Bank for Sight Restoration, backed up by The All-India Ophthalmological Society and the Indian Red Cross Society.

Experienced Indian eye surgeons particularly younger men who have shown outstanding ability should be given scholarships to take special courses in the eye surgery of corneal grafting in places where this operation is a common procedure.

All ophthalmologists should report their cases, successful and unsuccessful, in medical meetings and medical journals. Statements referring to successes should be guarded, knowing that an immediate success may not be a success, after a month or a year. If the information as to the source of material for grafting could be pooled the profession would be guided as to the best methods of obtaining suitable eyes.

Conclusion.—In India, especially in the interior, it is difficult to find ideal recipient or donor eyes for transplanting corneas. It is very difficult to find both recipient and donor eyes at the same time.

Further efforts should be made by all eye surgeons to do the corneal grafting operation as often as practicable. Experienced surgeons should be given scholarships for study of the techniques of corneal grafting.

The All-India Ophthalmological Society and the Indian Red Cross Society should develop, with some clinic or clinics where successful corneal grafting is being done, an organization such as the Eye Bank for Sight Restoration. A philanthropic person, or organization, could scarcely find a cause more fruitful in giving happiness.

If donor eyes are found and furnished, surgeons can go ahead with the finding of recipient patients. Surely, this important method of restoring sight should have full development in India with its hundreds of thousands of blind from opacities of the cornea.

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Medical News

L.T.M. EXAMINATION, 1947

The following candidates are declared to have passed the L.T.M. Examination held on the 6th October, 1947, and subsequent days:—

Passed

(Arranged in alphabetical order)

- Parimal Kumar Chanda, L.M.F. (Bengal), Private Practitioner.
 Hari Pada Chowdhuri, L.M.F. (Bengal), Private Practitioner.
 Brojendra Kumar Das Gupta, L.M.F. (Bengal), Assistant Medical Officer, Central Hospital, Borjuli Tea Estate, Assam.
 Mulshanker Motiram Dave, L.C.P. & S. (Bom.), Assistant Medical Officer, Lunawada State Dispensary, Bombay.
 Anil Krishna De, L.M.F. (Bengal), Private Practitioner.
 Jitendra Nath Ghosh, L.M.F. (Bengal), Private Practitioner.
 Robindra Kumar Ghosh, L.M.F. (Bengal), Private Practitioner.
 Chandi Charan Goswami, L.M.F. (Bengal), Private Practitioner.
 Jiban Ranjan Lahiri, L.M.F. (Bengal), Assistant Medical Officer, Borengajuli Tea Estate, Assam.
 Amal Kumar Mitra, L.M.F. (Bengal), Private Practitioner.
 Sukumar Mitra, L.M.F. (Bengal), Private Practitioner.
 Vinayak Vishwanath Paranjpe, L.M.F. (C.P.), S.M.S., Government of Bombay.
 Rasamoy Paul, L.M.F. (Bengal), House Surgeon, Bankura Medical School Hospital.
 Harirao Vishnupant Pophale, M.B., B.S. (Hyderabad), Private Practitioner.
 Katangur Prabhakar Reddy, M.B., B.S. (Hyderabad), Private Practitioner.
 Jyoti Bhusan Roy, L.M.F. (Bengal), Private Practitioner.
 Hirendra Kumar Saha Chowdhury, L.M.F. (Bengal), Private Practitioner.
 Naresh Chandra Sen, L.M.F. (Bengal), Private Practitioner.
 Jnanananda Sinha, L.M.F. (Bengal), Private Practitioner.
 Rash Mohon Talukder, L.M.F. (Bengal), Private Practitioner.

MEDICAL INSTITUTIONS IN U.K. CROWDED ADVICE TO INDIAN STUDENTS

(Being a press note issued by the Ministry of Health, Govt. of India, dated 17-11-47)

It has been brought to the notice of Government of India that many Indian medical students and doctors have proceeded to the United Kingdom for studies without first assuring themselves of admission to British hospitals and colleges. They expected to obtain admission in those institutions, but have not been able to do so, because at present U.K. hospitals and colleges are crowded with British war-returned personnel.

In view of the very limited number of vacancies available in such institutions persons intending to take up medical studies, whether post-graduate or otherwise, are advised not to leave India until they have obtained admission to the institution where they intend to prosecute their studies.

QUARANTINE RESTRICTIONS

(Being a press note dated 29-11-47 issued by the Director-General of Health Services, Govt. of India)

INFORMATION has been received by the Director-General of Health Services that the health authorities in Malayan Union have imposed quarantine restrictions on account of cholera against passengers from India.

In order to avoid being placed in quarantine on entry into Malayan Union, passengers leaving India for that country by sea and air are strongly advised to be in possession of cholera inoculation certificates showing that inoculation has been performed not less than six days and not more than six months prior to arrival in Malayan Union. The certificates should be in the international form.

EFFECT OF DDT ON PLANT LIFE

(Issued by the Press Information Bureau, Govt. of India, on 3-12-47)

In reply to a written question in the Constituent Assembly (Legislative) to-day, the Hon'ble Rajkumari Amrit Kaur, Health Minister, Government of India, said that there was no record of damage to foliage caused by DDT unless used dissolved in kerosene. She added: 'Dusts containing synthetic insecticides like DDT are sometimes used for plant protection. A great deal of experimental work is necessary to determine the extent of damage, if any, to plant life through adverse effects on pollination'.

RESEARCH WORK BY MEDICAL LICENTIATES

APPLICATIONS are cordially invited from Licentiate Doctors to undertake and conduct some research work in medicine, surgery and allied sciences likely to be useful from a treatment point of view. The applicant should kindly state (1) the problem of his research, (2) the location of his research with the facilities he has, (3) the period he might require to complete the research, and (4) the amount he might spend on it till its completion. The applicants are earnestly solicited to note that it should be purely a labour of love for the cause of Science and with a view to raise the Licentiate class in estimation of others.

P. H. SANT,

Secretary,

Scientific Committee, All-India Medical
Licentiates' Association, Bilaspur, C. P.

WORLD MEDICAL ASSOCIATION

(Abstracted from a note on the subject by Dr. P. B. Mukerji, President, Indian Medical Association, published in the *Jour. Ind. Med. Assoc.*, and from the editorial in the *B.M.J.*, 27th September, 1947, p. 498)

THE first initiative towards a world medical association was taken in 1946 when, under the joint auspices of the Association Professionnelle Internationale des Medecins and the British Medical Association, 33 medical associations in 31 countries sent their representatives to a 3-day conference held at the British Medical Association House in London, opening on 25th September. This conference, which was attended by over 40 full delegates and 32 observers, decided that there should be international liaison in the field of medicine and that an international organization should be brought into being to lend full support to the practitioners all over the world against the subtle and insidious forces which were menacing the age-old traditions and freedoms of the profession. Before breaking

up, this conference set up a provisional committee of nine members to work out a draft constitution and by-laws of the proposed association and to place same before a similar conference of representatives of national medical associations to be held at Paris in 1947 for consideration and adoption as the instrument governing its activities.

The second conference which held its sittings at Paris in the Domus Meshia, the Headquarters of the Confederation des Syndicats Medicaux Francais, from 17th to 20th September, 1947, was inaugurated by the French Minister of Health, who welcomed the delegates to the French capital and was attended by representatives from 48 national medical organizations. Throughout the proceedings the Confederation des Syndicats Medicaux Francais acted as a most generous host.

At the first part of the meeting, the delegates adopted the Draft Constitution and By-laws which were submitted by the Organizing Committee of nine, after suitable modification of some of the articles. The objects of the W.M.A. are contained in the following articles:—

- (1) To promote closer ties among the national medical organizations and among the doctors of the world by personal contact and all other means available.
- (2) To maintain the honour and protect the interests of the medical profession.
- (3) To study and report on the professional problems which confront the medical profession in the different countries.
- (4) To organize an exchange of information on matters of interest to the medical profession.
- (5) To establish relations with, and to present the views of the medical profession to the World Health Organization, the U.N.E.S.C.O. and other appropriate bodies.
- (6) To assist all peoples of the world to attain the highest possible level of health.
- (7) To promote world peace.

Membership of the organization is governed by Article 5 which was accepted in the following form:—

- (1) Those medical associations which sent delegates or observers to the International Medical Conference in London in September 1946; and
- (2) Any other national or territorial medical association which is fully representative of the medical profession in its country or territory or of the members of the medical profession of a recognized ethnic group in its country or territory.

The General Assembly which would be responsible for the general control and direction of the policy and affairs of the association would consist of delegates from the member-associations, each such association being entitled to appoint two delegates and to enjoy two votes, one for each delegate and two for one delegate, if the second was unable to be present. 'A delegate' it was decided 'shall be a person who is medically qualified and a member of the association he represents, and he shall be ordinarily resident in the territory of that association'. The Council which would carry into execution the resolutions passed by the General Assembly and administer the affairs of the association in accordance with the articles and by-laws, would be composed of the President, the President-elect, the Treasurer and ten members of the General Assembly elected at its annual meetings in the manner and for the period prescribed in the by-laws. It was decided that the English, the French and the Spanish would be the official languages of the Association and that a journal or a bulletin may be published periodically as decided upon by the Council. It is gratifying that India has obtained a seat in the Council, Dr. S. C. Sen, the Honorary General Secretary of the Indian Medical Association, who was one of the delegates, secured the third highest vote.

At the first meeting of the World Medical Association proper, which occupied the second half of the Proceedings, Dr. Charles Hill was appointed Acting Honorary

Secretary, Professor Marquis, Director of the School of Medicine at Rennes, was elected the first President and Dr. Routley the Chairman of the Council. The Treasurer, Dr. Leuch of Switzerland, in presenting his report pointed out that the funds from the subscriptions of the various national member-associations were inadequate for the tasks of the W.M.A. and reported to the meeting the generous offer made by the American delegates of \$50,000 a year for five years. To this gift certain conditions were attached, and because of these conditions feelings ran high. Briefly, they were that the money should be used for (i) the salaries of the Secretary and other officials of the clerical staff, (ii) the rent and rates of the headquarters office, and (iii) the cost of publication of the W.M.A.'s official bulletin or journal; also that the headquarters of the W.M.A. should be in North America, the exact location to be determined by Council and that the Council be instructed to work out a scheme of associate membership. Dr. L. H. Bauer, one of the delegates from the U.S.A., gave to the meeting a clear exposition of the circumstances of the gift. The money had been offered by friends of the A.M.A., principally industrialists, anxious to promote the interests of the W.M.A. The disbursement of the money would be under the control of a committee in the U.S.A. composed of five doctors and four laymen. If the business donors could be admitted under a scheme of associate membership, Dr. Bauer said, they should have the right to attend meetings but not, of course, the right to vote. The first speech of opposition to this proposal was made by Dr. P. B. Mukerji, President of the Indian Medical Association. He expressed his appreciation of the generosity of those who had made such a large sum of money available to the W.M.A. but doubted whether it should be accepted under such terms. He felt that the W.M.A. should work out its own salvation even if it meant that much of the work would have to continue to be done on a voluntary basis. The debate on this controversial subject continued on Friday. Irrespective of the conditions of the gift, it was decided that the headquarters of the Secretariat should be in North America. On the following day the General Assembly voted in favour of accepting the handsome gift of \$50,000 a year for five years. It is perhaps a commentary on the unsettled economy of the world that the W.M.A. which represents some 500,000 doctors could not raise sufficient funds to carry on its own work unaided.

After the business part of the meeting was over, the General Assembly took up for discussion two motions by Denmark and Great Britain and a document prepared by the Council of the British Medical Association entitled 'War Crimes and Medicine'. Prof. Charles Richet, a French medical victim who had spent some time in a German concentration camp, related his own experiences and was followed by one of the Greek delegates who described the brutalities committed in his country during the last war by members of the profession, acting under orders of the Nazi High Command. The Assembly listened in sympathy to these. It was finally agreed that German delegates should not be admitted to the W.M.A. until organized medicine in Germany condemned the past criminal acts of German doctors.

The following matters were also referred to the Council for appropriate action or investigation and report :—

- (i) The general arrangements for the organization and publication of a bulletin or journal.
- (ii) The preparation of a report on the enquiry into the present position of the medical profession in relation to the state.
- (iii) The motions of Luxembourg, supported by Australia, recommending the preparation of a comparative statement of standards of training for the medical profession and conditions of registration, and of a comparative statement on the qualifications of specialists.

(iv) The following motions by India : (a) That the Council be requested to study and report on the question of the advertisement of cures and medicines in the lay press, and (b) that the Council be requested to study and report on the question of unqualified and unauthorized medical practice.

(v) The preparation of standing orders to govern the procedure of meetings of the General Assembly.

(vi) The appointment of auditors.

The General Assembly decided to hold its 1948 meeting at Prague, the exact date to be fixed by the Council, and elected Dr. J. Stuckli (Czechoslovakia) as President for the year 1947-48.

The W.M.A. has set its hand to a great task, and if it is to achieve its highly important objects, it will have to secure the good will of the various national medical associations in all parts of the world. Much, of course, will depend upon the hard work, tact, and ability of the permanent Secretary, who is yet to be chosen.

PROCEEDINGS OF THE 2ND MEETING OF THE SURGICAL SOCIETY OF THE MEDICAL COLLEGE HOSPITALS, CALCUTTA

THE 2nd meeting of the Society was held on 11th October, 1947, at the Medical College, Calcutta, under the presidency of Dr. P. Chatterji, Prof. of Surgery. Dr. A. K. Basu read a paper on 'Care of spinal injury patients with paraplegia—A survey and report on 10 cases'. Dr. Basu mentioned the appalling mortality of this type of case—11 out of 15 cases treated in the Medical College Group of Hospitals during 1945-46 died and contrasted this result with that obtaining at the Ministry of Pensions Spinal Injury Centre at Stoke Mandeville, England. In his series of 10 cases, 5 patients died and only 2 could be got up on wheel chairs. He discussed the several problems facing a surgeon in charge of these cases. He differed from the current teaching of attempted hyperextension in spinal paraplegia except in G.S.W.s of the spine. In his opinion there is scarcely ever any indication for laminectomy or plaster fixation in spinal paraplegics. He advocated immediate suprapubic cystostomy and mentioned that the external cystostomy opening should be high up, small and the track oblique in order that leakage be reduced to a minimum. For cystitis and phosphatic incrustation of the bladder it was his practice to maintain acid reaction of urine and to wash out the bladder with 1 per cent acetic acid. Routine bladder irrigation was not employed. Small breakages of skin or superficial excoriations cannot always be prevented but with adequate and conscientious care from the nursing staff and with a leak-proof urinary fistula, it is possible to avoid large and penetrating sores. Recently skin grafting has been used to cover large granulating areas.

Maintenance of adequate nutrition was important and administration of high protein diet supplemented by prepared aminoacids when necessary was advocated. The physiotherapeutic part of the treatment involves prevention of contracture and deformity by use of light aluminium splints, passive movement of paralysed limbs and joints, massage and electrotherapy. Re-settlement of the paraplegics is a problem in which the state should help by instituting occupational therapy centres and special homes where the paraplegics, who are unfit to go back home, can be lodged.

In conclusion Dr. Basu reiterated his plea for a rational and humane approach to these unfortunate cases. He said that 'at least a partial solution of this problem lies in the centralization of such cases under one interested person, who will view their many problems with care and sympathy, who will direct, organize and stimulate and who by his own example—as well of those under him—will inspire the paraplegics, in spite of their disability, to be self-reliant and honourable members of society'.

A discussion ensued in which Dr. A. K. Roy asked whether hyperextension of these cases is ever indicated or necessary and mentioned a method introduced by an Edinburgh surgeon in which a long sand bag covered by bolster is laid transversely under the mattress and named by him 'Hyperextension mattress'. He also enquired whether suprapubic cystostomy was to be advocated in all cases with paraplegia or whether catheterization may be recommended for the first 2 or 3 days to see if spinal condition will show some improvement. Dr. U. C. Chakrabarty mentioned that in his experience it is almost impossible to get a leak-proof cystostomy. The President narrated his experiences of this type of case. He said that after doing 11 laminectomies in this type of cases, he was dissatisfied with the results and has given up this operation in spinal paraplegia. He agreed with Dr. Basu that violent methods of hyperextension are to be condemned and that immediate suprapubic cystostomy is the best. He enquired from Dr. Basu as to the most suitable time when these patients should be got up and he ended by reinforcing the plea for centralization of these cases.

Dr. Basu in reply reiterated his objection to violent methods of hyperextension and questioned whether the type of 'hyperextension mattress' that Dr. Roy mentioned would be of much use or would improve the nursing problem. In his opinion the high, narrow and oblique suprapubic track he described produces the minimum of leakage. About the time of getting these patients up, he said that the vertebral fracture dislocation must consolidate before one can recommend these patients to sit up and this usually takes 3 months. But after that time every effort must be made and every encouragement given to sit these patients up and to get them out of bed in wheel chairs.

At the end of the meeting a successful case of multiple tendon transplantation for complete musculo-spiral palsy was demonstrated by Dr. Basu.

INTERNATIONAL CONGRESS OF SURGEONS

40 COUNTRIES REPRESENTED AT LONDON MEETING

By G. V. T. CHURCH

(Reproduced from Release No. F953, dated 23rd September, 1947, issued by the British Information Services, New Delhi)

The largest gathering of surgeons seen for a quarter of a century has just concluded its deliberations in London. It was the 12th Congress of the International Society of Surgery, which opened on 15th September, and was attended by representatives from more than 40 countries.

Opening the Congress, Sir Alfred Webb-Johnson, President of the Royal College of Surgeons, said: 'By virtue of our calling we are patriots of humanity and know no frontiers. We are also ambassadors of our own countries and as such can help to promote peace, concord and understanding between nations'.

The Congress provided an opportunity for surgeons to pool their knowledge and to review the recent achievements of medical science. Overseas delegates were also provided with facilities to visit the London hospitals and to study their organization.

Physicians in Conference

Earlier in the month, London was also the scene of another conference of medical experts—the six-day International Congress of Physicians. This meeting was attended by no fewer than 1,300 delegates, representing 29 countries. Among those who went from India were Major Shone, I.M.S., Professor of Medicine at Andhra Medical College, Vizagapatam; Dr. S. M. K. Mallick of the University of the Punjab; and Dr. T. K. Babur of the Karachi Medical Association.

An important item on the agenda of the conference was Britain's contribution to the world in the form of penicillin. Its discoverer, Sir Alexander Fleming, opened the discussion. Describing the efforts made to simplify the administering of the drug, Sir Alexander

said that in the ordinary sense it was impossible to give an overdose of penicillin.

Dr. R. V. Christie of St. Bartholomew's Hospital, London, said that penicillin had revolutionized the treatment of bacterial diseases of the valves of the heart, which were almost 100 per cent fatal before the drug was discovered. Infection was now controlled in 93 per cent of the cases.

B.I.S. OFFICE IN CALCUTTA

(Reproduced from the Press Note, dated 22nd September, 1947, issued by the British Information Services, New Delhi)

A BRANCH of the British Information Services, Office of the High Commissioner for the United Kingdom in India, has been opened at 32, Chowringhee, Calcutta.

Mr. Brian Groves has been appointed Regional Information Officer and Mr. B. Dunelm Brown the Trade Information Officer.

A Reading Room which contains British periodicals has been opened in this office. This is open to the public from 9-30 a.m. to 5 p.m. on Mondays to Fridays and from 9-30 a.m. to 1 p.m. on Saturdays.

NURSING IN AUSTRALIA

By MARGARET LAWRENCE

(Reprinted from Release No. P/688. Issued by Australian High Commissioner's Office, New Delhi)

Most Australian nurses seeking work abroad have found that the high standing and standard of Australian nursing qualifies them for work in all parts of the world. The Registration Boards of the Australian States have reciprocal recognition with the General Nursing Councils of the British Isles and other parts of the British Empire where the training course covers at least three years.

The Australian Nursing Federation, which has branches in each State, is affiliated with the International Council of Nurses, and sent delegates to the Council's Congress in Atlantic City in 1947.

There are approximately 33,000 trained nurses working in Australia, of whom at least 28,000 are registered with the Nurses' Board of the six States. Present estimated shortage is 3,500 nurses.

The majority of trained nurses work in hospitals and institutions, but a large number are engaged in private and visiting nursing. Principal avenues for specialization are infant welfare work in such fields as Baby Health Centres, kindergartens and creches followed by public health, mental and industrial nursing. A limited number of nurses work in doctors' surgeries and laboratories, x-ray or radium clinics, or as air hostesses or ships' nurses.

The scattered nature of the population in the inland and the concentration of population in a few coastline cities make it inevitable that there should be vast differences of hospital and nursing conditions.

On the one hand, there are the 'Bush Nurses', who often work alone under conditions that require a great deal of self-reliance and initiative.

On the other hand, there are the great metropolitan hospitals, in which nursing staffs of several hundreds work in well-planned and equipped surroundings. American Army nurses who were stationed at the Royal Melbourne Hospital, which was lent to the U.S. Army from 1942 to 1944, agreed that the hospital and its luxurious nurses' home compared favourably in every respect with the leading hospitals in the States.

Training

Nurses' training is conducted at various approved hospitals in the capital and provincial cities. Only the larger hospitals have preliminary training schools. The training period for a general certificate is four years in New South Wales, Tasmania and Queensland. In the three other States the course was reduced to three years during World War II. On completing the course

and passing her final examinations a nurse becomes entitled to registration with the Nurses' Board in the State where she is trained.

During training the student nurse lives at the hospital and is provided with board and lodging; in most States uniforms are provided free. Laundry is done by the hospital. Hours worked vary between 44 and 48 per week.

Trainee nurses in Australia spend much more time in the wards than they do in U.S.A. and attend fewer lectures. The course of instruction, however, includes lectures in anatomy and physiology, general nursing, medical nursing, surgical nursing, hygiene and public health, materia medica, children's nursing, and invalid cookery.

Approximately 80 per cent of Australian nurses take also the nine months' midwifery course, and approximately 46 per cent take the three months' infant welfare course after completing their general training, though not necessarily immediately afterwards.

The Royal Victorian College of Nursing (the Victorian branch of the Australian Nursing Federation) is the only organization at present conducting post-graduate courses. Their course for Sister Tutors and Nursing Administration has been held in abeyance for the last two years pending government financial aid; the course will take one year (full-time) and will be held under the auspices of the University of Melbourne. The College also conducts a part-time course in industrial nursing, and arranges lectures for a Diploma in Nursing.

In most States courses may be taken for the certificates of the Royal Sanitary Institute, London, which includes health visits, school nursing and sanitary inspection. In New South Wales courses in paediatrics and tropical nursing may be taken.

University Status—Not Yet

In no States is nursing teaching affiliated with the Universities, which have not opened their doors as readily to the technical professions as those of the U.S.A. One of the immediate aims of nursing leaders in Victoria and New South Wales is the establishment of Nursing Colleges affiliated with the Universities and assisted financially by government grants.

Another aim is to increase the number of scholarships for post-graduate work. At present most nurses taking post-graduate courses have to spread them over several years. Scholarships are provided by the Australian Red Cross Society, the Florence Nightingale Memorial Fund and the Centaur Trust (in memory of Australian nurses lost when the hospital ship *Centaur* was torpedoed in 1943). About 20 Australian holders of such scholarships are at present taking post-graduate courses in England, mainly in hospital administration or sister tutor training at the Royal College of Nursing.

Nursing leaders believe that the nursing profession in Australia will not reach its peak of efficiency until uniformity in training, registration, remuneration and working conditions is achieved. At present these matters are controlled by six State governments instead of the Australian Federal Government.

Uniformity Aim

An Australia-wide conference of all nursing bodies will shortly be called by the Federal Minister for Health and Social Services, at which it is hoped that some progress towards uniformity will be made. Decisions of the Conference will not be binding on the States, however. Several leading nurses' organizations, such as the Royal Victorian College of Nursing and the Trained Nurses Guild, have prepared detailed plans for co-ordinating and organizing nursing services on a federal basis. One favoured plan proposes the appointment of a Director of Nursing, directly responsible to the Minister of Health, and a Commission of Nursing to work in conjunction with a Nursing Bureau.

Other vital questions are those of superannuation benefits and compensation for injury and sickness contracted while on duty. At present many of the large

metropolitan hospitals have system of superannuation, but it is by no means general throughout the profession. Public hospitals and many intermediate hospitals nurse their own staff free of charge. Other intermediate hospitals insist that their nurses join the Hospital Benefits Insurance Association, paying 3d. weekly. If the nurse becomes ill, the hospital takes the 2s. 2d. a week insurance money, and nurses her without any further charge.

Award Conditions

Of interest in the vexed problem of professional status was an interim judgment given by a judge of the Commonwealth Court of Conciliation and Arbitration in September 1945 that nursing was not an industry.

Wages, hours and conditions of work in each Australian State are regulated, either by Arbitration Court awards or by Wages Boards consisting of equal numbers of representatives of nurses and of hospital associations under an independent chairman. Conditions do not vary greatly in the different States, and the following determinations of the Hospital Nurses Wages Board in Victoria may be taken as typical.

Hours of work are 44 per week; but 88 hours may be worked in any two consecutive weeks, provided that overtime is paid for all work in excess of 48 hours in any such week. Staff nurses and trainees must receive three weeks' annual leave and all other employees four weeks, both with full pay.

Proportion of nurses to patients must not be less than one nurse to each 10 or fraction of 10 patients (day shift) and one nurse to each 15 or fraction of 15 patients (night shift).

Proportion of trainees to certified nurses must not be more than six trainees to each certificated nurse exclusive of the matron.

Wherever possible, single bedrooms must be provided; in no case shall more than two employees occupy the same bedroom. Separate accommodation must be provided for the night staff.

Rates of Pay

Board and lodging costs the hospital nurse only Rs. 43 monthly, which is deducted from her salary; an allowance is paid to her if she does not live at the hospital. Laundry is done free of charge, and uniforms, or an allowance for uniforms, are provided.

The following salaries (clear of the deduction for board) are the minimum that must be paid to some grades of hospital nurses in Victoria. The awards do not differ greatly in other States.

Trainee nurse, first year	Rs. 107-8-0
Staff nurse, first year	" 225-0-0
Sister, first year	" 270-0-0
Matron of hospital with 100 beds	" 375-0-0

Annual increments for second and third years range between Rs. 10-8 and Rs. 21 monthly. Any nurse who needs more than one certificate in connection with her duties must receive an additional Rs. 10-8 per month for each certificate required.

Private nurses receive Rs. 55 for a six-day working week, with a living out allowance of Rs. 20 to Rs. 24 per week.

Infant Welfare Nursing

There is a separate determination for infant welfare nurses, with additional provisions relating to allowances for travelling expenses. For instance, all out-of-pocket expenses reasonably incurred by an employee whose duties necessitate journeys and visits to various parts of the municipality are paid by the municipal authority concerned.

An outstanding feature of Australian nursing is the special care given to the younger generation, which has resulted in Australia's infant mortality figures being the second lowest in the world. During the five-year period 1935-39, Australia's infant mortality figures were 39 deaths per 1,000 births, as against 56 for U.S.A., 57 for England and Wales, and 70 for Canada.

American Army doctors and nurses stationed in Australia during the war made special visits to Australian mothercraft homes, where they saw what they described as 'miracles' performed in the treatment of babies suffering from feeding troubles.

Main difference between Australian and American infant nursing welfare practice is that Australians are strong advocates of breast-feeding wherever possible.

Unusually interesting and worthwhile work for nurses who like country-life is that of infant welfare nurse in the outback. Baby health nurses do a regular round of small country towns in the inland regions. They may travel in a caravan which is equipped as a Baby Health Clinic and Nurses' Living Quarters, or in a railway carriage, similarly equipped, which is attached to a train and uncoupled at a station then, after a scheduled time, recoupled and taken on to the next station. In other cases the nurse travels in a car, attending to mothers at halls or houses in the towns on her route.

Only a small proportion of infant welfare nurses work in the outback. The majority of work in the full or part-time Baby Health Centres run by suburban municipalities; or they may travel from one country town to another, the Centre at each being open on one or two days in the week only.

PATRIOTS OF HUMANITY

World's Doctors in Conference

By IAN COX

(Reprinted from Release No. F.981, dated 2nd October, 1947. Issued by British Information Services, New Delhi)

SURGEONS, by virtue of their calling, are all 'patriots of humanity and as such know no frontiers'. That was the keynote of Sir Alfred Webb-Johnson's welcome to nearly 500 surgeons from over 40 countries when they visited London for the 12th Conference of the International Society of Surgery. Sir Alfred is President of the Royal College of Surgeons, but had he been addressing the physicians as well, I doubt if he would have altered his words. The physicians had already begun their international conference and 13,000 doctors from all over the world were also in London.

Both conferences have been the first of their kind since the Second World War and of great importance because they provided an opportunity for free international discussion of the advances made in surgery and medicine everywhere during the last 10 years. In the province of surgery, several particular advances have been made within this period, and as soon as they are considered jointly, then open up completely new fields of surgical possibilities. The Conference has demonstrated how this applies, for example, to chest surgery.

Chest surgery

Until recently it was not possible for the chest to be opened successfully during an operation because, as soon as the negative pressure surrounding the lung was destroyed the lung would collapse. The development of intra-tracheal anaesthesia, perfected in Britain, has obviated this and it is now as practicable for a surgeon to open the chest as the abdomen. Basically, the method depends on the insertion of a tube into the trachea, an air-tight joint being provided by a collar round the outside of the tube. The air can then be fed into the lung down the inside of the tube from a bag-like arrangement at the distant end.

While this advance in technique has made the organs within the chest accessible to the surgeon, another development in quite a different field has greatly increased the use to which he can put his skill when once he has made such an access. This relates to the muscular system—the heart in particular—which recent work on an anti-blood clotting substance, called heparin, has rendered quite literally 'open to surgery'. A famous heart surgeon from Stockholm, who spoke at

the Conference, has employed this drug in his pioneer operation upon arteries.

Prior to its use, one of the dangers following an operation was pulmonary embolism caused by a clot of blood eventually coming to rest in the lung. This condition was responsible for fatalities of the order of two in every thousand. Now, by administering heparin to likely cases, the incidence is reduced to a minimum.

Control of blood clotting

This advance in the control of blood clotting, taken with that which rendered the chest accessible to the surgeon, has made possible the treatment of congenital abnormalities of the heart, hitherto eventually fatal to the child. These conditions result in the lack of blood in the lungs and in extreme cases produce what are known as 'Blue Babies'. At the Surgical Congress, it was described how pulmonary stenosis can be overcome by an operation that joins the normal portion of the pulmonary artery to the subclavian artery, thus short-circuiting the right of the heart and bringing increased supply of blood to the lungs.

The physicians also talked about the heart. Professor R. V. Christie of the Medical Research Council, for example, reported that penicillin had revolutionized the treatment of infective endocarditis which was about 100 per cent fatal before the discovery of the drug. Sir Alexander Fleming, the discoverer of the drug, described some of the research now being done to simplify its administration to patients. The main difficulty is that it is rapidly excreted by the kidneys; hence recent work has been aimed at slowing down its absorption.

The method that has the widest use at the moment is based on the incorporation of penicillin in an oil wax mixture which enables patients to maintain 300,000 units at a therapeutic level for as long as 24 hours. Formerly, it used to be given by continuous drip or by injections every three or four hours which was inconvenient both for the patient and the doctor. Excellent results have also been obtained recently with single daily injections of 500,000 units in watery solution and Sir Alexander Fleming considers that this may prove the most popular method of administering the drug.

Other contributions showed that the Medical Research Council is being very active in the investigation of antibiotics. Dr. Darcy Hunt, for example, is working on streptomycin. Of this, he said that early results are definitely encouraging and that the drug, in its pure state, is producing fewer toxic reactions, such as rashes and fevers; but there are still dangers attached to its uses.

AUSTRALIA'S OFFER OF ASSISTANCE

ANTI-CHOLERA VACCINE AND RED CROSS SUPPLIES

(Reprinted from Release No. P/682, dated 11th October, 1947. Issued by Australian High Commissioner's Office, New Delhi)

THAT the Australian Government has offered to supply anti-cholera vaccine free of charge to the Governments of India and Pakistan was confirmed to-day by the Australian High Commissioner (Lieut.-General Sir Iven Mackay).

The quantity mentioned as Australia's gift was 2,000,000 c.c.

Expressing the hope that fears for the spread of cholera would prove unfounded, Sir Iven Mackay said that Australians were deeply sympathetic with the many people in both Dominions suffering hardship and distress as result of the recent disturbances.

The Australian Red Cross also, he added, had communicated with Her Excellency Lady Mountbatten offering assistance, and asking her for guidance as to the type of relief most needed by distressed persons.

Sir Iven Mackay said that the Australian Government had already shown itself eager to arrange for a further increase in the shipment of wheat to India.

Public Health Section

SOME EXPERIENCES IN RURAL MEDICAL PRACTICE*

By V. ANANTACHARIU, L.I.M.
Vijaya Clinic, Nuzvid (S. India)

INDIA is said to contain seven lakhs of villages. Majority of the villagers in them are ill-educated. The villager, when his health deviates from normal, does not immediately apply for scientific consultation, either because such consultation is not always available or because it is not easily procurable for him; and yet the state of things is not allowed to Nature, which if unmeddled with, does correct matters in many respects. Various kinds of crude physical and mental treatments are resorted to. The following are some of the drugs with which the mofussil patient is drugged: (1) mercury in various forms as perchloride of mercury, calomel, crude mercury, *rasakarpoor*, etc., (2) opium, (3) thymol, (4) garlic, (5) *Calatropis indica*, (6) marking nut, (7) rubbing the cornea with copper coins, grass, etc., (8) asafoetida, (9) raw cattle dung as an application for scabies, (10) red hot cautery on various regions of the body of the patient in infantile convulsions. The patient gets in no way better but worse and in the end seeks admission for treatment to some scientific institution (if no further quackery comes in his way).

By the time the rural medical practitioner happens to see a case, very serious and grave complications have arisen. If the damage, to which some of the vital organs of the body are subjected, is not extensive such patients recover gradually but many cases of this nature become inevitably failures however skilfully one may try to restore order in the disturbed physiology of their systems.

The business of the rural medical practitioner has thus become more of prevention of complications than of treating actual diseases, when the village folk come under his observation. Almost all cases which apply to him for advice are to be treated in two ways: (1) antidoting for the various kinds of pills and potions administered during the previous handling of the cases and (2) from the disease point of view, we have a saying 'There is no man or woman who does not know about medicine and music'; the rural masses believe more in the layman's advice than in that of the schooled.

In infantile convulsions, instead of treating the cause of them (e.g. high temperature, intestinal parasite, nervous temperament, etc.), the infant is caught hold of and thrown into the air a

few feet high and again caught; it is brutally burnt with red hot iron on various portions of the body. Another malpractice among some communities is to cauterize the abdominal wall in various directions on the 3rd or 4th day after birth. The plea is that this treatment would improve its digestive function. As we all know the dangers of such hasty cauterizing are: (1) shock, (2) tetanus infection and (3) secondary infection from other organisms. A few escape, fortunately, from these dangers. The child cannot recover from the shock, and if by chance it recovers, the next danger is tetanus infection which brings on death in many cases.

In certain other instances, when a child was having convulsion, the juice of the leaves of *calatropis indica* was put in the nostrils of the baby in such a manner and dosage that the child developed deglutition pneumonia.

Crude mercury (*rasam*, *impure*) heads the list of drugs in the everyday practice of the village quack. Very few of his clientele actually escape poisoning with his dosage. The infant patients and young children under the age of ten years fortunately escape toxic symptoms in spite of the heavy drugging which is often resorted to for nearly 90 per cent of their complaints. But it is the unfortunate adult who cannot escape. The quack uses mercury in venereal diseases, arthritis of various kinds, diarrhoea, dysentery, 90 per cent of mofussil deliveries, fevers of various origin, for vague pains of the body during pregnancy, in cases of antepartum hæmorrhage, in paralysis and paresis of the limbs, etc. The dosage given is usually from $\frac{1}{4}$ to 1 tola in a single dose; or 6 to 12 grains continued for 15 to 20 days. The chain of symptoms of mercurial poisoning manifested by these patients is as follows: stomatitis, foetid smell from the breath, spongy, swollen, red, bleeding gums, and increased salivary secretions; nephritis, presence of albumin, blood and casts in the urine, absence of appetite, with a feeling of weight and discomfort in the stomach; a furred tongue; enlarged tonsils and pharyngeal glands; there is swelling and tenderness of the parotid and submaxillary glands; teeth get loosened; gums recede and become ulcerated; saliva gets thick and viscid; fever and depression set in. If the dose is large the symptoms get aggravated and end in the falling of the teeth; ulceration and abscess of the mouth, necrosis of the jaw bones; great prostration; anæmia; emaciation; repeated hæmorrhage and death.

I would like to quote here the case of a quack who suffered from mercurial paralysis. This quack used to prepare medicines by heating mercurial salts. During the preparation of these medicines, he used to inhale the mercurial vapours. Consequently after a period of some years he had paralysis, which was successfully

* Read at the meeting of the Nuzvid Medical Practitioners' Association, held on 27th July, 1947.

Nov., 1947]

treated by sodium thiosulphate injections and oral administration of purified sulphur.

The second drug in use in the malpraxis is opium (*Ahiphena*) $\frac{1}{2}$ to 2 grains in infants and more in adults. This is given as a routine thing to many mofussil infants for the first three months. The child gets drowsy and does not cry during nights giving relief to the mother; a large number of these children coming under observation for retention of urine, faeces, abdominal distension and coma. We find pin-hole contraction of the pupils.

The third drug in order is thymol. This is given either separately or in combination with *jund*. Dose 15 to 60 grains or more in children for indigestion, fever, cough, diarrhoea, etc. In the labour classes adults use thymol for vague pains all over the body in 15 to 30 grains doses. In cases where the drug is not given in larger doses, there will be some relief of the said symptoms. In the majority of cases, somehow, patients complain of difficult micturition, scanty high coloured urine, with shooting pains in the region of the kidneys. There are a few instances of abortion when pregnant women were given this drug for some pains in the body during the early months of pregnancy; some other patients complained of vertigo after taking this drug.

Garlic (*Allium sativum*) is used not only as a drug but also as an article of food. In deep-seated inflammations such as fibrositis, neuritis, arthritis and pleuritis, its juice is applied externally as a counter-irritant. Internally, it is given in diarrhoea, dysentery, bronchitis, pulmonary tuberculosis, whooping cough and in states of unconsciousness, where the upper respiratory tract is loaded with phlegm, the drug of choice with the unschooled vaidyas is the juice of the garlic in doses of 1 to 2 or 3 oz. It is actually allowed to run into the nostrils and mouth. The properties of the raw juice are: it is a caustic rubefacient, irritating the part whichever it comes into contact with, and actually vesicles would appear; the patient vomits and purges due to gastro-intestinal irritation; the irritation is to such an extent that the patient was passing blood both in the vomit and purging. The garlic is largely used by the womenfolk during puerperium. It is used not only as a drug to act on the uterine muscle, but also as an article of food. A quantity of about 1 to 2 tolas is taken modified in a single diet. A girl (a near blood relation of the writer) was taking this garlic continuously for more than 2 to 3 weeks in very large doses, following probably the saying: 'The garlic does more good to a puerperal woman than what a mother does really to her beloved daughter'. What happened with this particular girl was that she was nursing a baby of seven or eight months. For the well-being of the child the mother was advised to observe diet. The conception of diet in the rustic sense was that the quantity of diet should be nothing but modified garlic. When she

took garlic continuously for some weeks, the baby developed petechial hæmorrhages here and there on the body. These hæmorrhagic spots developed gradually in number and intensity and one day the child was observed to be unable to take milk from the mother's breast. She was unable to swallow even water. There was paralysis first of one side of the face and then of the same side of the body. The child was fairly conscious during the early part of this paralytic stroke but in the later stages, when she got extremely weak due to lack of nourishment, coma supervened and the child died. The cause of death in this particular baby was attributed to hæmorrhage of a fairly large amount in the brain area. The important fact is this that there was wholesale hæmorrhage all over in the body and brain. Among other drugs, which have been largely used for various conditions, are the marking nut, *asafætida* and *chitramoolam* (*Plumbago zeylanica*). Every drug when properly applied has its therapeutic value; but when the therapeutic dose is exceeded, it acts as a poison and brings trouble.

One more interesting instance of the ignorance of the uneducated masses is the following: 'During the anxious period of illness the doctor is invited respectfully and treated in the best manner possible. Everything of the patient is almost offered if he takes proper care of the patient and treats him. After finishing the job with the doctor, the party give a warning to the medicine-man that there is a dog which has delivered pups in their house and advise him not to visit frequently for fear of being bitten by the dog. He is scolded for the red pills which have caused the patient hiccough and also for the black pills which have caused vomiting. The party wishes that the medicines were buried in earth and challenges the ability of the doctor. "After all the patient," it is said, "got well after prayers to the family deities (*potharazu* and *polaramma*) and the offer of a goat and a saree for each. All right, then, what is it you want for your remuneration; you can have a measure of grain".'

The Indian Medical Gazette

Fifty Years Ago

CAN TYPHOID FEVER BE ABORTED?

THE reply in the affirmative to this question has raised a somewhat acrimonious and unnecessary wordy war among medical men in the United States. We are not usually taught that this disease can be cut short; in fact, our chief reliance is upon maintaining the patient's strength and upon good nursing. An American physician, however, with characteristic boldness, has replied with no uncertain sound that by his method of treatment this disease can surely be aborted and robbed of its chief terrors. From

time to time cases of typhoid fever, which had been cut short in the second or third week, have been reported, and it has not always been possible to beg the question by assuming an incorrect diagnosis. It would, however, be very difficult to make such an easy assumption in view of the long list of cases recorded by Dr. J. E. Woodbridge of Cleveland, Ohio, at the late meeting of the American Association; nor is it possible to assume that the 193 physicians, whose cases are quoted and tabulated by Dr. Woodbridge, are deliberately making false statements, therefore we are bound to pay attention to their truly remarkable results. It appears that some years ago Dr. Woodbridge introduced a new method of intestinal antiseptics for the treatment of typhoid fever, and we have now before us the detailed results of an extensive trial. We have not been able to accurately find out the exact formula, nor do we know the composition of the antiseptic tablets used. We gather, however, that they contain guaiacol, thymol, and formaldehyde. The method appears to be at once eliminative and antiseptic.

Within recent years we have heard much of the antiseptic treatment of typhoid fever. There is scarcely a known antiseptic agent which has not been tried, from corrosive sublimate to betanaphthol, each in its turn earning a short-lived reputation only to end in disappointment. Why the particular combination suggested by the American physician should be so successful we are unable to say, but that it is so clear when we read of 7,827 cases with a death-rate of only 1.9 per cent (*under two per cent*). Moreover, the average duration of illness in 4,935 cases was only 12 days. Truly this is abortive treatment *par excellence*. Of the cases which recovered 101 had intestinal hæmorrhage, and 95 relapses are recorded. According to our author 'the severity of the disease is greatly ameliorated, the symptoms minified (*sic*), all grave complications averted and dangerous sequelæ prevented'. 'The tongue', he goes on to say, 'is quickly rendered moist, tympanites quickly relieved, the excrements (*sic*) lose their offensive odour, delirium is rare, and the "typhoid state" unknown'. With such a record well may Dr. Woodbridge exclaim that 'these results have never before been obtained, in hospital or private practice, in so large a number of cases and by so many physicians'. To anticipate the obvious criticism* that the American type of the disease is a mild one or has changed, Dr. Woodbridge quotes some recent statistics of the disease in several large hospitals in the States, which show that in the closing years of the century typhoid fever has lost none of the virulence that distinguished it forty years ago. To emphasize the

extraordinary nature of his results he quotes the death-rate within the past ten years of several well-known hospitals, *e.g.* St. Bartholomew's 10 per cent, Boston Hospital 13 per cent, St. Louis' City Hospital 20 per cent, while Murchison placed it at 17.4. The most favourable death-rate we have before heard of is that of Brisbane Hospital where the strict cold-bath treatment gave a mortality of only 7 per cent. All of these compare badly with Dr. Woodbridge's 'under two per cent'.

To us in India, where enteric fever is an ever-present evil, it will be very satisfactory should these remarkable results be confirmed and repeated by physicians here and in other countries. This method of treatment is sure to be tried, and we shall be glad to receive reports about it; for the present we suppress a natural scepticism and only allow ourselves to say it is almost 'too good to be true'.

THE SCIENTIFIC STUDY OF PREVENTIVE MEDICINE IN INDIA

To the indomitable energy and genius of a single man, who had neither influence nor large means, modern biologists owe the establishment of the magnificent Zoological Station at Naples, an institution which has become world famous amongst the scientific men of all nations.

It is not much more than thirty years ago that naturalists were wont to study marine fauna as dried or preserved specimens stored in museums, in which state they bore but a remote resemblance to the living animals. Small wonder is it that classification was in a chaotic condition, and that so little was known about the development and organs of a large portion of the Invertebrate Kingdom.

In 1870, a private *docent* of Jena, Dr. Anton Dohrn, was inspired with the original idea of founding a marine station for biological studies, an institution wherein the fauna of the sea could be observed in their free-swimming condition. Instinctively he chose one of the most beautiful spots on earth on the shores of the Mediterranean. After encountering almost insuperable difficulties, after meeting with many rebuffs from the Italian and German governments, after spending the whole of his fortune, he finally triumphed at the end of five years' struggle and succeeded in establishing, on a secure basis, an international temple of science. It is one of the sights of Naples, and it combines laboratories, aquaria, and such accessories of a marine station as steamers and fishing boats for dredging and trawling purposes. Here students of all nationalities are assembled, and many of the European States contribute to the maintenance of the institution, receiving in exchange the right to keep one or more investigators at the laboratory. The German government alone pays £4,000 per annum.

If Dohrn could effect such a result in a subject like zoology, and if another enthusiastic

* The accuracy of the diagnosis in the reported cases has been challenged, but we may note that the cases treated by this method in the Bellevue Hospital, New York, answered to the serum reaction test of the Eberth bacillus.

THE USES OF VITAMIN E

While the main use of vitamin E up to the present has been the treatment of cases of habitual abortion and sterility of dietary origin (with success in about 70% of cases when whole oil—as in Fertitol—was given) wheat germ oil is being increasingly used for cases of primary muscular dystrophy, amyotrophic lateral sclerosis, anterior poliomyelitis and in rarer cases such as amyotonia congenita.

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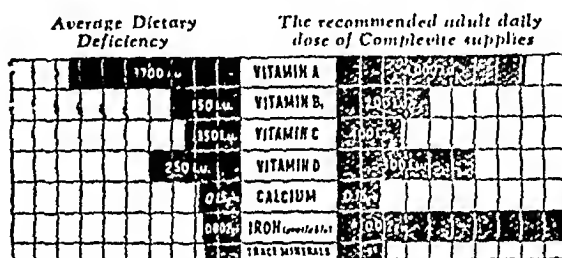
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Fig. 1



Fig. 2

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The details and illustrations above are of an actual case. T. J. Smith and Nephew Ltd., Hull, England, manufacturers of Elastoplast, Elastocrepe and Jelonet, are privileged to publish this typical instance of the use of their products with success in the belief that such records will be of interest.

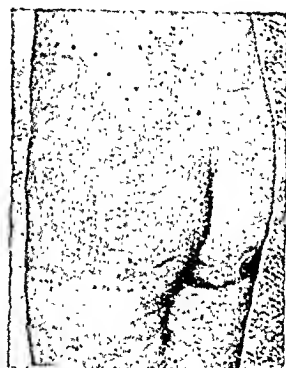


Fig. 3

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scientific genius was able to inaugurate the *Institut Pasteur* to deal with bacteriology and antitoxins, surely it were possible for a great and powerful government, like that of India, to found an Imperial Institute for Preventive Medicine on sound and comprehensive principles.

To clear the way, in case of any misapprehension, let us first consider what preventive medicine is *not*. It is not merely a matter of conservancy, sanitation and vaccination, though unfortunately that is a commonly accepted definition of it current in India. Neither is it wholly and solely a matter of bacteriology, or of antitoxins and serum-therapy. It is not simply a combination of chemistry and hygiene or of chemistry and bacteriology, though one might be led to infer that such is the case if we were to judge from the nature and designations of certain appointments in India.

The subject of preventive medicine has a far wider scope, and includes every subject that conduces to the health and comfort of civilized communities. It is concerned with chemistry and physics, with physiology, pathology and bacteriology, with hygiene in its narrow sense of water-supply, drainage and ventilation, with food and dietaries, clothing and buildings, trades and occupations, with epidemiology and medicine, not to mention also meteorology, climatology and geology, and in fact, everything that bears directly or indirectly on the preservation of health and the prevention of disease amongst mankind. But the attention and energy of investigators should not be confined only to problems bearing on the aetiology and spread of disease. One of the main objects of such a Central Institute should be to conduct observations and experiments along practical lines, tending towards economy in imperial, provincial and local expenditure. Knowledge is power, and in no subject is that proverb more true than in its application to the health and prosperity of a nation.

C'est le premier pas qui coute, and this should be kept in mind in the initiation of a Central or Imperial Institute for research. Each of the presidency cities should have its laboratories for teaching purposes—chemical, physiological, pathological and bacteriological, also laboratories for provincial and municipal work—hygienic, medico-legal, exercise, etc. But over and above, and quite separate from this, the Imperial or Central Institute should deal with the larger and more intricate problems that cannot be solved by merely applying to India the results obtained by observers in Europe. Each province should contribute an annual sum, raised by the Local Government and by means of private donations, towards the maintenance of this Central Institute. In exchange each province should be allowed to send one or more medical officers, specially qualified to work at particular subjects, under the guidance and direction of a permanent director and his assistant.

The question of expense, and how to meet it, is an all-important one in these hard times. In all probabilities this could be overcome by Local Governments transferring certain second class stations, now held by members of the Indian Medical Service, to the uncovenanted branch of the Civil Medical Department, and to senior Civil or Military Assistant Surgeons. Such a procedure would be in accordance with the avowed principle of attempting to improve the prospects in these services, and at the same time the pay saved by the change would go towards the maintenance of the I.M.S. officers who would be transferred to special duty at the institute, such transfers not involving any material increase in the *cadre* of this service.

Current Topics, Etc.

(These topics could not be included in the Special Venereal Diseases number for lack of space.)

Reactions to a Bismuth Compound

By R. N. BARNETT

(Abstracted from the *Journal of the American Medical Association*, 6th September, 1947, Vol. 135, p. 28)

A GIRL, aged 27 months, had an uneventful adenoidectomy. Two weeks later she received four of the children's size suppositories for control of gingivitis. In four days coma and convulsions developed, and death followed within seventy-two hours. At autopsy, cerebral oedema, a swollen fatty liver and an acute duodenal ulcer were present.

An asthmatic boy, aged 6 years, received one suppository containing the bismuth salt each day for three weeks. No suppositories were given for four days, but he then received four suppositories in forty-eight hours for a pharyngitis. On the fifth day the pharyngitis had subsided, food was withheld and a tonsillectomy performed with the patient under ether anaesthesia. Coma supervened within twenty-four hours, and death followed within thirty-six hours. At autopsy, there was cerebral oedema and a fatty liver. The fasting state plus anaesthesia provided an ideal substrate for the action of any hepatotoxin.

A boy, 2 years of age, was given two 'analbis' suppositories for otitis media and pharyngitis. About eighteen hours after the second suppository he went into severe collapse, followed the next day by fever and lethargy. He recovered after supportive measures and BAL therapy. The total dosage of BAL per kilogram of body weight is one of the largest ever given. This drug was administered at the suggestion of Dr. W. T. Salter, professor of pharmacology at the Yale University School of Medicine, in the belief that the unknown toxic agent might be a heavy metal. Whether its use was of any value is a matter of conjecture.

A girl, aged 2½ years, had been well until 18th December, 1946, when there developed a cough, an elevation of temperature to 102°F., and an apparent infection of the upper part of the respiratory tract. She vomited twice. On examination, she was moderately dehydrated; the pharynx was red and swollen; the liver was not palpable. She was given rectal fluids, acetylsalicylic acid and three suppositories containing the bismuth salt of diallylacetic acid in the course of about twenty-four hours. By 20th December, she appeared well. At 3 a.m., 21st December, she awoke suddenly and vomited. Later that day she was admitted to Babies Hospital because of drowsiness. She was semi-comatose on admission; the abdomen was rounded and soft, the liver large and somewhat tender. She was treated with clyses and a transfusion, but on 22nd December she became cyanotic, with slow Cheyne-Stokes respirations, and died.

The chief post-mortem observations were a large liver weighing 720 gm., which was mottled bright red and yellow, mild ascites (100 c.c.) and œdema of the peritoneal fat and connective tissue, decided œdema of the gastric mucosa and extreme cerebral œdema. There was no icterus. On microscopic examination, the liver showed acute early necrosis and the renal tubules contained much fat. There was a mild interstitial pneumonia, and examination of other organs revealed little that was unusual. There was no excess of bismuth in the liver.

Suppositories bearing the same lot number as those given to patients 1, 2 and 3 were analysed. The bismuth content was less than that declared (0.0150 gm. against 0.0225 gm.). No heavy metals other than bismuth were found. The only substance found besides bismuth was a fatty acid in quantities too small for analysis. This is presumably what is identified in the literature supplied by the company as heptadienecarboxylic acid. More accurately this is said to be diallylacetic acid.

This is closely related to several allyl compounds of known high toxicity, as allyl amine and allyl alcohol and allyl formate, which is hepatotoxic in rats.

It is not believed that bismuth is the agent responsible for the toxic action of these suppositories for several reasons. It was present in only small amounts in the organs on which analyses were performed. There were no inclusion bodies in the renal tubular epithelium, nor was there any evident nephritis. Finally, there is no convincing evidence that bismuth has ever caused hepatic damage of the type here described.

The assumption that the heptadienecarboxylic acid or a contaminant thereof may be a hitherto undescribed hepatotoxin seems plausible.

Four cases are described with autopsy observation in 3 of which profound collapse, fever, central nervous system symptoms and in 3 cases death followed the administration of 'analbis' suppositories containing the bismuth salt of hepta-

dienecarboxylic acid (diallylacetic acid) for the treatment of infections of the upper part of the respiratory tract in children.

The Eligibility of Syphilitic Persons for Life Insurance

By J. E. MOORE

and

I. L. SCHAMBERG

(Abstracted from the *Journal of the American Medical Association*, 30th August, 1947, Vol. 134, p. 1532)

THREE alternative policies as to syphilis in applicants would appear to be open:—

1. To disregard altogether the factor of syphilis, on the grounds that (a) less than 10 per cent of applicants (percentage varying on the basis of race, sex, age, socio-economic status and geographic location) are infected at the time of application, (b) in those who show clinical or laboratory evidence of the disease at the time of application, or who admit a history of infection or of treatment for it, the overall increased mortality hazard may be disregarded, since (c) in those without clinical or laboratory evidence of infection, or who deny its previous existence, a substantial number are nevertheless already actually infected but are medically unrecognized as having the disease; some are deliberately concealing the fact or will become infected after insurance is granted, thereby increasing the hazard in the supposed non-syphilitic group to a point approaching that in the syphilitic group.

2. To require, as at present, the routine questioning of all applicants as to the existence of syphilis and in addition to insist on a routine blood serologic test for syphilis of all applicants.

3. To continue, as at present, to decide individually the question of insurability of all persons in whom syphilis is recognized by clinical or laboratory evidence or by history and to ignore the factor of syphilis in all others, with full knowledge that the latter group will nevertheless contain a substantial proportion of infected persons.

Each of these alternatives is open to several objections. The first would unquestionably impose a slight but definite increase in the overall actuarial risk, by the inclusion of persons with definitely or probably fatal forms of the disease.

The second, requiring routine serologic testing of all applicants, would add materially to the cost of examination and, especially in the case of the Veterans Administration, would impose the difficult, and in some cases nearly impossible, task of differentiating biologic false positive serologic tests from those actually due to syphilis.

Because of these objections to the first two alternatives, the third (in spite of its obvious medical and actuarial drawbacks and the

premium which it places on concealment of disease on the part of applicants) will probably continue in force.

Whether either the second or third alternative is chosen—whether a deliberate search for syphilis is made by means of routine serologic testing of all applicants or whether the problem is dealt with largely by chance, as at present—what shall be done with the applicant in whom syphilis is detected?

Here certain principles appear clear:—

1. No applicant with untreated syphilis in any stage should be granted insurance if, as with commercial companies, the applicant must demonstrate good health.

2. If treatment has been given, it should have been adequate. In this connection, the term adequate is used to describe the amount and character of treatment which is sufficient to cure the majority of patients in a particular phase of syphilitic infection. It is recognized that many individual patients may have been cured with less than this average amount, while others may not have achieved cure with much more. If an applicant has received less than the average adequate amount, and even though he may appear cured as a result thereof, he should be required to complete the average amount of treatment before insurance will be granted. The standard of adequacy is a constantly changing one, and too rigid requirements should not be laid down.

3. In certain phases of syphilitic infection, though not in all, a period of observation following treatment should be required, in order to demonstrate the probability of cure.

4. In all patients with syphilis the cerebrospinal fluid, tested in a reliable laboratory, should have been shown to be within normal limits as to cell count, quantitative protein determination, complement-fixation test and colloidal test, these tests having been made two years or more after infection.

5. The physical status should be normal, without clinical evidence of cardiovascular syphilis or neurosyphilis. Scars of healed gummatous lesions or stigmas of congenital syphilis should not, however, preclude insurance.

Prevention of Reaction to BAL

By M. TYE.

and

J. M. SIEGEL

(Abstracted from the *Journal of the American Medical Association*, 23rd August, 1947, Vol. 134, p. 1477)

IN the treatment of poisoning due to heavy metal with BAL (dimercaprol, or 2, 3-dimercaptopropanol) undesirable side-effects have been previously noted. These reactions consist chiefly of some of the following symptoms: nausea, vomiting, headache, burning sensation

of gums, nose and eyes, profuse lacrimation and salivation, abdominal cramps, flushing of face, tingling of extremities, burning of skin, feeling of constriction of the chest and restlessness. At times these complaints are so severe as to necessitate discontinuance of treatment.

In view of the close resemblance of the severe symptoms to those seen in cases of serum sensitivity reactions 0.6 c.c. of a 1:1,000 solution of epinephrine hydrochloride was given intramuscularly. He obtained rapid and complete relief.

Influenced by this response the writers gave the patient 25 mg. of ephedrine sulphate by mouth one-half hour before the next injections of BAL in an attempt to prevent a recurrence of the reaction. None of the toxic symptoms were noted after any of the ten subsequent injections of graded doses of 2 to 4.5 c.c. of a 10 per cent solution of BAL preceded by an oral dose of ephedrine sulphate.

A second case reaffirmed the foregoing observation. A Negro with a generalized dermatitis due to a heavy metal was started on BAL therapy after being prepared with ephedrine sulphate, 25 mg., given orally a half-hour before each injection. No toxic symptoms were noted. After the sixth injection (dose 4.5 c.c.) had been given the 25 mg. ephedrine sulphate was omitted prior to the seventh dose. Within a few minutes the patient noted severe lacrimation, headache, a feeling of constriction in the chest and a burning sensation of the skin of the trunk. The following injections of BAL were preceded by 50 mg. of ephedrine sulphate a half-hour before their administration, and none of the previous unpleasant symptoms were experienced.

Preparation of the patient with ephedrine sulphate shortly before the injection of BAL may lessen the intensity or prevent entirely the side-effects of this valuable remedy.

Reiter's Syndrome

(Abstracted from the *British Medical Journal*, 12th April, 1947, Vol. I, p. 495)

THE syndrome consisting of polyarthritis, urethritis, and conjunctivitis, originally described by Reiter in 1916, is perhaps not yet entitled to be known as Reiter's disease, since its aetiology remains obscure and it is consequently not known to be a single entity. Several correspondents have discussed its possible relationship to bacillary dysentery. The association between these two conditions seems to be far from constant and the evidence as a whole does not support the belief that Reiter's syndrome has any consistent connection with intestinal disease. The resemblance to gonorrhoea is striking only in the distribution of the lesions; all tests for gonococcal infection give negative results, and neither sulphonamides nor penicillin are curative. The disease runs a long febrile course, its

different manifestations often appearing successively and the arthritis migrating from one joint to another. It is apparently confined to young adult males and is not considered to be venereal in origin. No explanation of the age and sex distribution can be offered.

In the absence of any demonstrable causative bacterium it has been supposed that the disease is due to a virus and inclusion bodies have been demonstrated in material from the urethra and conjunctiva. Also incriminated are the so-called 'pleuropneumonia-like' organisms, which have so long been denied the dignity of proper nomenclature. Although responsible for two specific animal diseases—bovine pleuropneumonia and contagious agalactia of sheep—these organisms have not been fully identified as the cause of any human disease, though they exist in the human body. Their extreme pleomorphism and the special techniques required for their study are obstacles to ready recognition, and perhaps much remains to be discovered about their activities in relation to human pathology. Another line of argument is therapeutic: pleuropneumonia-like organisms are sensitive to gold salts, and patients were accordingly treated with myocrisin. This appears to have had a very satisfactory effect, the lesions resolving and the sedimentation rate falling steadily. This is no proof of a particular aetiology, since many drugs are active against more than one type of micro-organism. On the other hand, it is the result to be expected in accordance with the hypothesis, and in the interests both of further investigation and of successful therapy the effect of gold should certainly be observed in future cases.

Treatment of Early Syphilis with Penicillin

By T. H. STERNBERG

and

W. LEIFER

(Abstracted from the *Journal of the American Medical Association*, 4th January, 1947, Vol. 133, p. 1)

An analysis has been made by the authors of the army records of 1,400 men with early syphilis treated with 2,400,000 units of penicillin in aqueous solution or isotonic solution of sodium chloride prior to 1st February, 1945.

There were no severe toxic reactions, and all patients completed the prescribed schedule of treatment.

Approximately 84 per cent of the patients were observed for over nine months following treatment.

Satisfactory progress was obtained in 94.3 per cent of 600 cases of sero-negative primary syphilis, in 89.9 per cent of 564 cases of sero-positive primary syphilis and in 83.0 per cent of 236 cases of secondary syphilis.

The cerebrospinal fluid was examined following treatment in 719 patients; it was normal in 714 and abnormal in 5 (0.69 per cent).

The high overall satisfactory progress rate of 90.6 per cent, admittedly tentative because of inadequate follow-up, was attributed to the considerable proportion of cases of the disease in the primary stage (83.1 per cent) and to the fact that the patients were probably treated with penicillins of satisfactory potency.

The rate of failure was approximately 5 per cent in the 790 white patients and 15 per cent in the 610 Negro patients, and the implications of this disparity in respect to reinfection were discussed.

Penicillin in the Treatment of Neuro-syphilis

By A. S. ROSE

and

H. C. SOLOMON

(Abstracted from the *Journal of the American Medical Association*, 4th January, 1947, Vol. 133, p. 5)

Two hundred and thirty-six patients with neuro-syphilis were treated with penicillin between 1st February, 1944 and 1st April, 1946. Of these, 210 are now being followed. The clinical results in the first 100 cases followed one year or more are presented. The results of examination of the spinal fluid of all patients on whom an examination was obtained at least three months after treatment, as well as the 100 cases followed a year, are tabulated.

Clinical results

The evaluation of clinical results of treatment in a disease so complex as late symptomatic neuro-syphilis is extremely difficult. Psychiatric symptoms may be affected, as in the non-syphilitic patient, by changes in the environment, by alterations in the general physical status or by the administration of active treatment. Furthermore, patients may show improvement in some symptoms and progression in others. New symptoms such as convulsions may appear while all other symptoms improve. To obviate as many of these difficulties as possible, the writers present the clinical results only in cases followed at least one year, and we classify the status of the patients as 'improved', 'no change' and 'worse'.

The majority of patients were given a short course of fever therapy in combination with penicillin. The fever therapy consists of four to six paroxysms of malarial fever with temperatures above 104°F. or a total of twenty hours of temperature above 105°F. No other antisiphilitic treatment was given. If more treatment was needed, administration of penicillin was repeated.

Twelve of the patients with dementia paralytica were treated with penicillin alone. Nine

(75 per cent) of these 12 patients required retreatment with penicillin. The small number of patients in this group makes it impossible to draw any conclusion other than that 3,000,000 units of penicillin is insufficient treatment for dementia paralytica.

Each patient was given 3,000,000 units of penicillin intramuscularly as a course of treatment. Intervals of injection and the number of units per injection were varied according to plan.

Clinical results of the 100 patients followed one year or more show 62 improved, 35 with no change and 3 worse. Thirty-eight patients were retreated with penicillin.

Following treatment the cell count and total protein contents of the spinal fluid return toward normal in from three to six months and six to nine months respectively. The strength of the Wassermann titre decreases more slowly. Of the 100 patients followed a year or more, 11 have a negative Wassermann reaction.

In one patient dying of dementia paralytica it was felt that penicillin given during an acute, extremely overactive psychosis may have contributed to the death. At least no quietening effect was obtained, and it is possible that penicillin intensified the symptoms. In no other case did it appear that treatment contributed to the fatal outcome.

Because the majority of patients in this study received a short course of fever therapy as well as penicillin, the question is raised as to whether the changes observed are due to fever therapy. A survey of results of examination of spinal fluid in the 19 patients treated with penicillin alone reveals similar and comparable changes to the larger group, although the shift in the titration of Wassermann reactions was less striking. This, together with published data from other clinics, demonstrates that penicillin alone will effect a change in the spinal fluid. Since the amount of fever therapy administered to these patients is considerably below that which experience has proved necessary for the best treatment of this disease, we believe that the results to be obtained at the end of several years will give evidence of the usefulness of penicillin.

The need for retreatment in a little more than one-third of the cases followed one year or more indicates that 3,000,000 units of penicillin combined with a short course of fever therapy is not optimum treatment for late symptomatic neuro-syphilis.

Early Congenital Syphilis

By R. V. PLATOU *et al.*

(Abstracted from the *Journal of the American Medical Association*, 4th January, 1947, Vol. 133, p. 10)

AMONG 252 infants with congenital syphilis, a single course of penicillin administered over a period of seven and one-half to fifteen days has yielded satisfactory results in 73 per cent,

unsatisfactory in 9.1 per cent, and in 17.9 per cent results are still classed as uncertain. Empirically judged severity of syphilis or cerebrospinal abnormalities had little prognostic meaning; the latter improved remarkably after treatment. Dosage schedules employing more than 40,000 units of the drug per kilogram of body weight yielded better results than those employing lesser amounts. There is some evidence to suggest that larger dosage schedules administered over a longer period of time may be more effective. Dramatic clearing of active manifestations of infection during or soon after treatment is the rule. Clinical relapses have been infrequent, with only 6 encountered at intervals of three to eleven months after treatment. As time passes, the number of cases with unsatisfactory or uncertain results diminishes, while there is a proportionate increase in that of symptomatic and serologic cures.

Changes to seronegativity are not unusual a year or more after the completion of treatment, though most babies become seronegative between the fourth and twelfth months following therapy.

Judged by outcome, all planned treatment schedules employing sodium penicillin alone have been remarkably effective. Their efficacy, rapidity and safety in this 'exquisitely chronic' disease have amply demonstrated that this drug is the best single agent yet employed for the treatment of congenital syphilis.

Penicillin therapy has not altered the familiar contention that treatment of the baby is far more important than treatment of its syphilis. Hazards inherent in socio-economic environments responsible for a high incidence of this disease undoubtedly account for the high fatality rates seen under any form of treatment. Although syphilis or its direct sequelae must be regarded as potent contributory factors, deaths are almost always adequately explainable on non-syphilitic bases.

Until the true make-up of commercial penicillin has been clarified or until crystalline fractions are evaluated, the writers offer the following broad suggestions for therapy:

1. Young syphilitic infants should receive a total dosage of at least 100,000 units per kilogram of body weight.

2. This amount should be divided into approximately one hundred and twenty equal intramuscular injections given over a period of twelve to fifteen days.

3. These injections should be given at intervals of no longer than three hours around the clock.

Serological Tests for Syphilis

(Abstracted from a letter from A. C. T. Vaughan published in the *Lancet*, no. XXIV of Vol. I, 1947, p. 923)

In their interesting recent paper in *Lancet*, 3rd May, 1947, p. 588, on the Results of Parallel Kahn and Wassermann Tests in Relation to

Penicillin Therapy of Syphilis, J. F. Heggie and his colleagues demonstrated, in those patients whose serological state was examined at short intervals, that the Wassermann reaction reverted to negative before the Kahn.

A possible reason for this 'disproportionate rate of reversal' is that the conditions of the standard Harrison-Wyler-Wassermann which they used do not permit the detection of small amounts of syphilitic 'antibody'. Both complement-fixation and precipitation tests for syphilis are based on the same fundamental principle—the specific combination of the lipoidal haptené ('antigen') with syphilitic 'antibody'. In the former use is made of the well-known property, particularly marked during the early stages of formation, of specific aggregates to fix complement; while in the latter the conditions of the reaction are so adjusted that aggregation proceeds to visible precipitation.

Complement is fixed most avidly in the zone of slight antibody excess; so, in order to obtain maximal sensitivity from the Wassermann reaction when examining sera of low reactivity (e.g. patients near the completion of their treatment), it is necessary, among other things, to use a more dilute 'antigen' than that used in the standard Wassermann. This is essentially the basis of Richardson's modification of the Harrison-Wyler technique, which the writer has found to be most satisfactory in that, among other advantages, the increased sensitivity is not obtained at the price of specificity.

Some results from treated syphilitics whose sera were examined by the Richardson modified test as well as by the standard Wassermann and standard Kahn are set out in tables I and II.

It is evident from table I that the modified test is much more sensitive than the standard Wassermann, being in fact comparable to the standard Kahn.

From table II it may be seen that not only is there an increase in the number of reactive sera detected when the modified Wassermann test is used but also in the number of agreements with the Kahn test. Further, in the cases treated with arsenic and bismuth, the number of sera which gave a positive Kahn reaction but a negative modified Wassermann was balanced by a similar number in which the reverse held. (The results from the smaller number of meprobamate-treated cases show a similar trend.)

The reasons for these divergences are not always clear but may include the following:—

1. Slight day-by-day variation in the sensitivity of the tests are inevitable in a complex biological reaction, such as the Wassermann, when carried out under routine conditions, and differences in the fixability of different samples of complement are a potent cause of such variation.

2. Subjective errors which are due to the difficulty of maintaining over a period of time a constant assessment of the strength of minimal reactions (both the Kahn and the Wassermann

show a more or less continuous change in intensity from positive to negative).

3. Neither test is strictly quantitative.

It would, therefore, appear an advantage to carry out a sensitive complement-fixation test in addition to a satisfactory precipitation technique such as the standard Kahn, not only for their differing intrinsic ranges of sensitivity but also to compensate for any possible daily variation.

A. B. R. C.

Behcet's Syndrome

(Abstracted from a letter from Nikos Lorandos published in the *British Medical Journal*, 21st June, 1947, p. 901)

THE writer (Nikos Lorandos of Athens) expresses his views of Dr. E. W. Prosser Thomas's article on Behcet's syndrome as well as on thrombophlebitis. In the *Proceedings of the Medical Society of Athens* (1930, p. 586) Dr. B. Adamantiades presented the first known case of recurrent iritis with hypopyon, insisting at the same time on the small ulcerations of the mouth and genitalia. All these three elements were characterized by recurrences, appearing either at the same time or at independent periods. Later (*Annales d'Oculistique*, 1931, 168, 271) followed the same description of this syndrome in French. In 1931, Dr. Daskalopoulos (*Proceedings of the Greek Medical Society*, Athens, p. 717) describes a record case. There follows the description of Whitwell (1934), and later again in 1937 Behcet, of Constantinople, describes the syndrome in the *Dermatologische Wochenschrift* (105, 1152), in German.

The same author (Dr. Adamantiades), in a careful study of two other cases which came under his notice, found that a fourth element is quite common and describes in detail the thrombophlebitis either of the central vein of the retina or of the legs (Greek Ophthalmic Society, 7th June, 1945, and *Annales d'Oculistique*, 1946, 179, 143). This element was also observed by Urbanek, J. (*Zt. f. Augenh.*, 1929, 69, 174), Blobner, F. (*Zt. f. Augenh.*, 1937, 91, 129), Delord, E. (*Annales d'Oculistique*, 1941; 177, 366), and Tebeyan and Kalfayan (*Annales d'Oculistique*, 1945, 178, 335), either on the legs or in the retina. The writer is pleased to see that this thrombophlebitis was also observed by Dr. Prosser Thomas.

Dr. Adamantiades describes this syndrome as the complex syndrome of recurrent iritis with hypopyon, which according to the rules of nomenclature is the name and term accepted by Greek medical literature. The writer adds that this syndrome is comparable to the disease known as 'periodic ophthalmia (moon-blindness) of horses' according to the same author. The writer also wants to add that Dr. Thomas's contribution to the subject is much welcomed in Greek medical circles in Athens.

A. B. R. C.

Stevens-Johnson Syndrome affecting Genitals:**A Case Report**

By D. R. LAURENCE

(Abstracted from the *Lancet*, 21st June, 1947, Vol. I, p. 888)

A SOLDIER, aged 21, was admitted on 28th March, 1947, complaining of sore throat and cough with watery sputum for 6 days. For a month he had had a mild dry eczematous dermatitis of both forearms, but during the previous 2 to 3 days a different rash had developed, consisting in small circular scaly erythematous patches which coalesced in places. These were numerous on the forearms and there were a few on the trunk. On the day after admission a severe stomatitis, conjunctivitis, and halanitis developed. The mouth was covered with a peeling greyish membrane, and the pharynx was red and injected. Three swabs from the mouth showed no Vincent's organisms, and from the throat *Streptococcus viridans* was grown. The conjunctivitis was very severe; swabs showed numerous pus cells, but no organisms were isolated. The glans penis was red, and the skin was weeping and peeling. A white blood-cell count at this stage showed 19,500 leucocytes of which 90 per cent were polymorphs, 8 per cent lymphocytes, and 2 per cent monocytes. Sputum examination showed numerous pus cells, and no one organism was predominant on culture.

The patient was very ill and toxic. He could only swallow fluids, and even this was difficult. On examination of the chest moist râles were heard all over both sides. The temperature was swinging between 101°F. and 103°F. On the second day the skin lesions became bullous with purplish edges, and a diagnosis of erythema multiforme was made. The temperature subsided almost to normal by the 7th day, although the mouth and eyes were still severely affected. The bronchitis was still severe, a pint of frothy mucopurulent sputum being produced each day. The skin lesions had increased in number and were chiefly on the back and arms. The lips were grossly swollen and cracked, and the patient could hardly speak.

By the 26th day he was almost well. The conjunctivitis was improving and all that remained of the skin lesions were brown pigmented patches. A stricture of the foreskin had developed as a result of the inflammation.

Swabs taken from the bullous skin lesions gave no organisms on culture; nor did swabs from the penis. It was not possible to decide whether there was a pure urethritis owing to the severe inflammation and swelling of the glans prepuce.

The patient recovered and when last seen six weeks after discharge from hospital he was well, except for the occurrence for the first time of psoriasis on his arms and trunk. The pigmentation of the skin remained. Penicillin was

administered during the early stages of the disease, but did not seem to influence its course.

**Frequency of Syphilis and Some of its
Clinical Aspects in a General
Hospital Service in Algiers**

By F. G. MARILL

(From the *Bulletin de la Societe de Pathologie Exotique*, Vol. 39, p. 178, as abstracted in the *Bulletin of Hygiene*, January 1947, Vol. 22, p. 28)

THIS author draws attention to the fact that little is known about the incidence of syphilis in Algeria; he therefore analysed case records of 1,836 general hospital admissions over the period from 1919 to 1937 and gives the results of 1,297; of these 750 were Europeans, 62 Jews, and 485 natives, the respective numbers proved to have syphilis being: Europeans 155 (20.66 per cent), Jews 11 (17.75 per cent), and natives 120 (24.74 per cent); in addition 84 Europeans, 8 Jews and 99 natives suffering from other diseases had positive serum reactions.

As regards neurosyphilis, there were 40 cases (22 of G. P. I.) among Europeans, that is one in 187 of all cases and one in six of those with syphilis, and among natives 21 cases (7 of G. P. I.), that is one in 23 of all cases and one in 10 of those with syphilis.

There were 18 cases of aortitis or aneurysm among Europeans and 9 among natives; 3 of gumma in Europeans and 14 in natives; and 3 of bone lesions in Europeans and 15 in natives.

In a discussion which followed, Montel (from Saigon) pointed out that the foregoing confirmed his belief that syphilis is the same disease everywhere and the parenchymatous neurosyphilis is far commoner in coloured races than has hitherto been supposed.

A. B. R. C.

**The Treatment of Gonorrhœa with
Streptomycin**
By B. D. CHINN *et al.*(From the *American Journal of Syphilis, Gonorrhœa and Venereal Diseases*, May, 1947, Vol. 31, p. 268, as abstracted in the *International Medical Digest*, August, 1947, Vol. 51, p. 99)

'If therapeutic resistance to penicillin should develop in gonorrhœa, as occurred in the case of the sulphonamides, it would be encouraging to know in advance of the availability of another drug for treatment. Accordingly, as a preliminary study, four men with acute gonorrhœal urethritis, confirmed by smear and culture, were each given 0.1 gm. of streptomycin sulfate dissolved in 3 c.c. of physiologic salt solution at hourly intervals for 5 doses. All were observed daily for three days' post-treatment and at the

seventh and tenth days. . . . Three consecutive negative cultures within 10 days after therapy and the absence of or marked improvement in clinical findings were considered evidence of cure'.

'All four cases responded promptly within 24 to 48 hours by a reduction or cessation of the urethral discharge. Cultures, following prostatic massage, were made at each examination and in all instances were found to be negative.'

'A larger series of cases was then treated in order to determine the optimum dosage. Treatment with a single dose of 0.5 gm. of streptomycin was first attempted and it was found that consistent cures could be obtained in this way'. Treatment was instituted with 0.5 gm. and lesser amounts of streptomycin in water solution as a single injection into the gluteal muscle.

All cases treated with a single injection of 0.3 gm. or more were cured. 'Twenty patients in a group of 22 cases treated with 0.2 gm. were cured, and only two of five cases treated with a single injection of 0.1 gm. were cured'.

'The failures were re-treated successfully by the following means: two of the failures with 0.1 gm. were cured by re-treatment with 300,000 units of penicillin in peanut oil and beeswax, and another of these failures was cured with 0.2 gm. of streptomycin. The two failures with 0.2 gm. were cured by re-treatment with 0.2 gm. of streptomycin'.

'Toxic reactions were relatively mild. Some patients complained of pain for several hours at the site of injection. No skin reactions were noted in any case. In two cases typical Herxheimer reactions occurred and in these the blood serologic tests for syphilis were subsequently found to be positive'.

Studies on Chancroid. III. Ducrey Skin Reactions in Negro Hospital Patients

By A. HEYMAN,

and

P. B. BEESON

(Abstracted from the *Journal of Venereal Disease Information*, April 1946, Vol. 27, p. 104)

DUCREY skin tests were done on 473 Negro hospital patients. It was found that 29.5 per cent of adults showed positive skin reactions, while none of 87 children reacted positively. Positive skin reactions began to appear in individuals between the ages of 15 and 24 years. The incidence then rose in succeeding decades, but declined slightly in patients older than 55 years. Positive skin tests occurred at an earlier age in female than in male patients and were more common in syphilitic than in non-syphilitic individuals. The considerable number of positive reactions found in individuals belonging to the older age groups indicates that the skin reactivity remains for many years after its

development. The presence of positive skin reactions in more than one-fourth of the Negro population in this vicinity limits the diagnostic usefulness of this test to a considerable degree.

No attempt was made to obtain a history of chancroid or to demonstrate existing infection among the subjects tested.

The foregoing evidence that the age incidence of development of positive Ducrey skin reactions corresponds with the period of greatest sexual activity suggests that the reaction is a specific one. On the other hand, the number of persons giving positive reactions is far higher than could be accounted for by the incidence of recognized chancroid in the same population. It is possible, however, that subclinical chancroid infections are relatively common, as in the case with many other infectious diseases. It is also possible that positive skin reactions may result from the presence of Ducrey bacilli on normal genitals.

Reiter's Disease

By P. N. BARDHAN

(Abstracted from the *British Medical Journal*, 5th July, 1947, Vol. II, p. 32)

THE author draws attention to his four cases, none of which had any relationship with bacillary dysentery. Further, in India, bacillary dysentery cases are seen literally by thousands, and yet there are no authentic records of Reiter's disease. Had the two conditions been aetiologicaly related there would surely have been more cases of Reiter's disease in this country.

The categorical statement made that '... there is no relation to sexual intercourse' is not wholly correct. Kristjansen described his case in detail in 1930 where the infection was traced to a girl of 16 who for two years had had a yellow vaginal discharge. This girl had also infected another man at about the same time, and the second victim developed only an uncomplicated urethritis lasting three months. In neither man was the gonococcus or any other organism found. The girl herself was examined and found to have had only an inflamed vagina, but gonococci were not demonstrated in her either. The sexual relationship in these two cases is clear. One of the four cases also developed the condition after extramarital coitus.

Neutrophil leucocytosis has been reported in all the cases, but one had an eosinophilia of 4 to 7 per cent in a total leucocyte count of 11,000 to 13,000. This may mean that allergy is a factor in the disease. This case went through the gamut of bilateral conjunctivitis and polyarthritis, and the eosinophilia persisted over the earlier part of the illness. The patient did not have any parasitic infection or infestation. The possibility of allergy being aetiologicaly responsible is strengthened by the observation of Forbes that his case was associated with dental

sepsis. Junghans tells about a case in conjunction with a furuncle in the upper lip, while Fruehwald described two cases, in one of which the first sign was urethritis and in the other, joint pain in the left foot. The example of erythema nodosum being the result of a variety of infective processes may be mentioned as a possible parallel to the incidence of Reiter's disease following upon non-specific infections.

In none of the four cases observed was the complement-fixation test for gonococci done, but gonococci were not found in any of the exudates by the usual staining methods. The tests were repeated many times and under varying clinical conditions.

The Herxheimer Reactions of Relatively Small Doses of Penicillin

By S. OLANSKY

(Abstracted from *Bulletin of Hygiene*, Vol. 22, No 6, June 1947, p. 400)

Six cases are presented in which severe Herxheimer reactions followed the injection of 1,000 units of penicillin. Therefore penicillin, even in small doses, should not be administered to patients with late or complicated syphilis as such reactions may be disastrous until a course of bismuth has been given.

A. B. R. C.

Penicillin in the Treatment of Syphilis in Children

By JOSEPH YAMPOLSKY, M.D.,

and

ALBERT HEYMAN, M.D.

(Abstracted from the *Journal of the American Medical Association*, 19th October, 1946, p. 368)

CONGENITAL syphilis is often severer than the acquired infection. Doses of penicillin comparable to those effective in adults are not entirely satisfactory in the treatment of the infantile infection, and further investigation of this problem is necessary.

The result of penicillin treatment of syphilis in children varies considerably and depends on the type and duration of the infection.

Sixty-one children with various manifestations of syphilitic infection were treated with penicillin. The drug appears to be an effective agent in the treatment of infantile congenital syphilis, and satisfactory results were obtained in 23 of 32 children treated for this condition.

Seven of the children have been followed for four to eight months, while 22 children have been observed for twelve to twenty months. The remaining 3 patients died soon after treatment.

These 23 children now present a normal response to the serologic test or have a steadily decreasing titre. All of them are clinically well, have normal spinal fluids and exhibit no clinical symptoms of the disease. Four children have persistently positive Kahn tests sixteen months after treatment. These patients were older than 4 months at the onset of treatment, and their sero-resistance is believed to be the result of late diagnosis and treatment.

The writers do not believe that the 3 fatalities in this series are related to penicillin therapy. Two of the deaths apparently resulted from an overwhelming syphilitic infection in premature and malnourished infants, while the third fatality remains unexplained.

The results obtained in this study indicate that penicillin is an effective agent in the treatment of infantile congenital syphilis. Although the optimum dosage of penicillin cannot be determined in such a small series of cases, the writers believe that a total dose of penicillin of 100,000 units per kilogram of body weight is effective in the treatment of the majority of these cases.

The serologic test for syphilis often became normal in three to six months, but patients with originally high titres sometimes required nine to fourteen months for a complete serologic reversal to occur.

Herxheimer reactions occurred in approximately one-half of the cases. These consisted of sharp elevations of temperature, which did not appear to be injurious to the child. These reactions occurred despite the administration of the drug in gradually increasing doses. No other reactions were observed.

Nine patients with interstitial keratitis were also treated with penicillin.

Each patient was given approximately 50,000 units of penicillin per kilogram of body weight, intramuscularly, in equally divided doses every three hours for seven and one-half days.

The serologic titre of most of these patients fell slightly, but no reversals of the serologic test have thus far been observed. In only one of these patients did penicillin therapy achieve excellent results, with the return of near-normal vision. All the others continue to show moderate to severe visual impairment. Although penicillin solution was instilled locally in several patients, this procedure did not seem to improve the results of treatment.

The results obtained in the treatment of interstitial keratitis indicate that this condition is refractory to parenteral penicillin therapy. The poor response of this manifestation to all forms of antisiphilitic therapy has long been observed. Recent work has indicated that the refractoriness of interstitial keratitis to treatment is due to the lack of vascularity of the cornea and the low concentration of the antispirechætal agent in the cornea. Although satisfactory concentrations of penicillin in the ocular tissues are said to occur after the local instillation of penicillin,

this form of therapy did not improve the results in their cases.

No response was obtained in any of the patients with Clutton's joints who were treated with parenteral penicillin. This type of arthritis is also refractory to routine anti-syphilitic treatment.

Acquired syphilis in children seemed to respond readily to doses of penicillin comparable to those used in adults, i.e. 40,000 units per kilogram of body weight.

Six patients with late congenital asymptomatic neurosyphilis were also treated with penicillin. Most of these patients had received adequate arsenic and bismuth therapy previously with no apparent effect on the spinal fluid observations. The age of these patients at the onset of treatment ranged from 10 to 25 years. The spinal fluid in the majority of these patients had group III findings, showed a strongly positive Wassermann test with an elevation in the cell count and the protein level, and the mastic curve reaction.

These patients received a total dosage of 40,000 units of penicillin per kilogram of body weight in seven and one-half days.

Four patients have obtained a satisfactory spinal fluid response and the mastic curve, protein level and cell count are normal one year after treatment. The spinal fluid response to the Wassermann test in each of these patients is still positive, but there has been a reduction in titre.

The changes in the spinal fluid in late congenital asymptomatic neurosyphilis were in general satisfactory and comparable to those obtained with fever therapy.

Two patients with juvenile paresis were treated with penicillin alone. Neither of these children displayed much clinical change, but the spinal fluid indicated some improvement.

Two children with recent progressive eighth nerve deafness were also given penicillin, and doses of 100,000 units per kilogram of body weight were used. No change was observed in the severer case of deafness three months after the completion of therapy. In the milder case, however, some improvement in hearing has occurred.

L'Étiologie de la Repression de L'Inceste (The Etiology of the Repression of Incest)

By MARC LANVAL, D.S.S. (Pp. 416). Brussels
(Abstracted from a review by V. R. Khanolkar,
M.D., in *Marriage Hygiene*, Vol. 1, No. 1,
August 1947, p. 34)

The thesis developed by Lanval is suggestive and may be briefly stated.

1. Human instincts are essential components of man's intimate make-up. There is therefore

a constant urge in him to satisfy them. The sex instinct is probably the most insistent, and the urge for its satisfaction is often tyrannical. Man is lazy and improvident by nature, he shuns effort as much as possible and seeks the easier way out of his difficulties. As sex instinct is probably present from the moment of birth, the infant and the child encounter the first objects of their desire and jealousy in their immediate surroundings. With the awakening of the sex desire at puberty, the adolescent is tempted to seek someone to share his erotic games in his family group. This is the easy way out for his longings as it facilitates the search, the approach and conquest of a participant. Incest holds out easy possibilities for the gratification of an urge and humanity carries in its soul an undeclared partiality for a simpler procedure.

2. Sex instinct demands vigorous excitation for its full satisfaction. Such excitation could only be provoked by an unfamiliarity with the person desired. The members of a family or a group living or working together are often incapable of such stimulation by reason of their proximity and banality. This leads to an indifference between different members of the group so far as sex relationship is concerned and if any individual pursues his courtship towards an unwilling partner, the act is considered obscene and evokes violent repulsion in most instances.

These two opposite tendencies of sex attraction and repulsion explain the dimorphic response in a family group to the fulfilment of a primitive instinct. The laws regulating marriages in a community and the concessions and dispensations earned from time to time represent a compromise between these tendencies and the relative dominance of one or the other under the particular circumstances.

3. Human communities constantly endeavour to maintain peace and harmony among its members by restricting the liberty of the individual in several acts which affect the society. They try to ensure a continuity of the group by inculcating notions of respect for authority and to preserve unity in the group by fostering a loyalty to it. The sex instincts of the individual are similarly restrained to avoid the jealousies and the disruptive effects of incest in the group. Repressions are techniques direct and indirect, sacred and profane, to enforce certain restrictions as there is a constant and subconscious urge to break through them. The number, the extent and the rigidity of these restrictions are primarily dependent on the sense of solidarity in the family or the community and the strength of family ties between the individual members.

4. The restrictions and prohibitions regulating marriage and the repression of incest are a social technique to preserve the prestige of authority and are a pledge for its continuity.

Studies on Lymphogranuloma Venereum Complement-Fixing Antigens

By MAURICE R. HILLEMANN

and

CLARA NIGG

(Abstracted from the *Journal of Immunology*,
Vol. 53, June 1946, p. 201)

THE demonstration of a certain community of antigen has served as a basis for including a number of viruses in one group referred to as the psittacosis-lymphogranuloma venereum group. Among the viruses included in this group are those of psittacosis, ornithosis, lymphogranuloma venereum (LV), mouse pneumonitis, meningopneumonitis, feline pneumonitis, and human pneumonitis, and Illinois.

The purpose of this paper is to describe an ether soluble fraction whose reactivity in complement-fixation tests apparently was identical to that of the initial infected yolk sac suspension.

In view of the protein-polysaccharide-lipid complex characteristic of certain fractions of gram-negative bacteria (24-26) it seemed possible that the lymphogranuloma venereum complement-fixing antigen might also contain such a complex.

Samples of freshly prepared LV suspension, each of which contained 20 per cent yolk sac with or without urea and/or phenol, were extracted with anæsthetic ether after 3 weeks of refrigeration.

Six volumes of anæsthetic ether were added to each suspension which was shaken briefly and placed in the refrigerator overnight after which the supernatant ether was removed. A second extraction was made in the same manner. The two ether extracts were pooled and concentrated to twice the volume of the original suspension, resulting in a volume equivalent to 10 per cent yolk sac suspension. The pooled extracts were stored in the refrigerator.

For use, 2.0 ml. of extract were concentrated by evaporation in the 56°C. water bath to about 0.2 ml. which left sufficient ether to keep the lipids in solution. Two ml. of saline were then added to the concentrated volume. By shaking the saline suspension in the water bath at 56°C. the ether was evaporated to a volume at which it would theoretically be completely soluble in the amount of the saline solution used. Satisfactory saline suspensions could never be prepared from ether extracts which had been evaporated to dryness. Analogous fractions were prepared from normal yolk sac suspension. All antigens were kept sterile throughout their preparation.

It will be seen from the results presented in table I that not only was the complement-fixing activity quite completely extracted from untreated and urea-treated parent suspensions, but the titre of the ether extracts was 1 : 800 as compared to 1 : 200 of the respective parent

suspensions, representing a fourfold enhancement. Analogous fractions prepared from normal yolk sac suspensions showed no complement-fixing activity.

It should be noted that the suspensions used in the experiments described in this paper had been aged for three weeks which seems to be necessary to effect the complete extraction of the complement-fixing activity with ether.

Even strongly anticomplementary suspensions yielded ether extract antigens which were not at all anticomplementary. The ether extract of the phenolized suspension was not more active than the parent suspension. Preliminary treatment with phenol prevented enhancement of the ether extract.

A zone phenomenon was noted with the 1 : 100 dilution of the ether extracts. This zoning effect was occasionally noted in titrations of LV sera and antigens.

The ether extract antigen was investigated by comparing this antigen with phenolized antigen in tests with sera from human beings infected with psittacosis, ornithosis and LV and with one serum from a Wassermann-negative laboratory worker.

Table II shows that the ether extract and phenolized antigens were fixed to about the same degree with psittacosis and ornithosis serums as well as with LV serum but not with normal sera. No fixation occurred in tests with the corresponding normal control antigens. These results show that although ether extraction effects a considerable purification, this antigen nevertheless retains its group reactive character.

Several factors appeared to determine the degree of enhancement of the ether soluble fraction. Ageing of the suspension was of first importance. Maximal dispersion of extract antigen in saline solution also appeared to determine the degree of demonstrable enhancement.

Although the chemical nature of the extract antigen is not known, it seems to be similar in some respects to the glucolipids obtained from bacterial cells. A carbohydrate nature was previously suggested in view of the fact that antigens in the form of whole yolk sac suspensions are stable to boiling and even autoclaving under certain conditions. While the solubility of the antigen in ether might suggest a lipoidal nature, the authors recognize the possibility that the antigen may be more apparent than real. Possibly the antigen is carried into the ether because of its union with certain yolk lipids. Whether the complement-fixing antigen would be soluble in ether if the virus were grown in the absence of yolk lipids is under investigation.

The extract antigens are superior to crude suspensions in several respects: (a) They are much less turbid. (b) They have never been anticomplementary. (c) Satisfactory ether extract antigens may be obtained from highly anticomplementary suspensions.

Maximal enhancement in the ether extract depended on (a) preliminary ageing of the yolk sac suspensions, (b) degree of dispersion of the extract in saline solution, and (c) absence of phenol.

Lymphogranulomatous Strictures of the Rectum

(Reprinted from *Medical Newsletter* No. M349, dated February 1947, prepared by the American Medical Association)

STRICTURES of the rectum due to lymphogranuloma venereum are a serious threat to life in some instances. Negro women are chiefly affected. Some conditions are mild and seem to cure themselves. Other conditions progress in spite of all known methods of treatment. It is the authors' opinion that these variations in clinical behaviour result from the fact that there are different strains of the virus and that the virus produces a reaction according to the host. The early diagnosis and treatment in all cases is important.

In the pre-stricture stage sulphonamide compounds seem to have some value, but there is a question as to whether sulphonamide drugs can prevent permanently an extension of the processes in some cases. It is likewise true that in some of the instances in which sulphonamide drugs seem to have been of value the evidence is not conclusive as yet that these patients might not have done as well without the sulphonamide compounds as far as checking the activity of the virus is concerned. Sulphonamide drugs do help in clearing up the secondary superimposed infections that are present in these cases and thus improve the condition of the patient clinically. Penicillin has proved valueless in our hands.

Once a fibrous stricture has occurred, drugs are of value only by elimination of the toxic effect of secondary bacterial invasion due to the fact that the blood supply to and through the dense scar tissue is so lessened that no adequate therapeutic concentration of the drug is possible. Some conditions do not progress rapidly and are not serious, while other conditions do progress rapidly in spite of all forms of treatments, with the exception of early excision. Colostomy helps many patients (1) by lessening secondary infection and (2) by overcoming the toxic effects of chronic obstruction of the bowel.

Surgical treatment alone is of value once a fibrous stricture of any considerable extent is developed. Warthen's obliteration of the cul-de-sac operation offers the possibility of lessening the complications that are inherent in colostomies, namely, anterior grade and retrograde herniation. It cannot, however, prevent stenosis of the colostomy opening, which occurs in many instances. Pauchet's excision operation or a modification thereof at this time offers the best method of cure for strictures low in rectum. This does not exclude the sacroperineal excision

operation of Hartmann. These operations are of such magnitude that they should be performed only by experienced surgeons.

When the disease involves the entire rectum or is high in the rectum, involving the recto-sigmoid area, abdominoperineal extirpation is indicated if the patient's clinical condition does not improve after colostomy. In the rare cases in which the descending colon is involved, a permanent artificial anus in the transverse colon should be made. Carcinoma occurs as a superimposed factor in a sufficiently large number of cases to be of clinical significance.

(Wright, Louis T., et al.: Lymphogranulomatous Strictures of the Rectum, *Am. J. Surg.*, 53, 499, November 1946.)

Medicolegal

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DEATH FROM BARBITONE POISONING

(Abstracted from the *Pharmaceutical Journal*, Vol. 158, 29th March, 1947, p. 199)

An inquest was held at Birmingham on a 48-year-old man who had died from barbitone poisoning, due to an error on the part of the chemist, who had affixed the wrong label to the box. A verdict of accidental death was recorded.

The doctor said that he prescribed 36½ gm. tablets of M&B 760, four to be taken at once and two every four hours afterwards, and 24 barbitone tablets, to be taken two each evening to assist sleep. He found that the directions on the boxes had been transposed, and it appeared that the chemist had labelled the boxes wrongly. The wife had been inadvertently giving her husband the barbitone tablets instead of the M&B, and in all he had had sixteen tablets of barbitone.

The Coroner said it was quite clear that Holloway had made a mistake, and he admitted it. There was a human element in everything, and there was no gross or culpable negligence on Holloway's part, or any intention of doing anyone any harm. He was doing his best to do his job, but he had made a fatal mistake. The system he had used was not foolproof, and it seemed that in dealing with dangerous drugs they should be dealt with separately. As far as the court was concerned there was no suggestion of criminal negligence.

A. B. R. C.

A LONG GESTATION PERIOD

(From the *British Medical Journal*, ii, 5th July, 1947, p. 36)

ENGLISH law dislikes rigid rules of evidence binding the court to presumptions of fact. For instance, whereas the law of several foreign countries lays down limits for the possible period of gestation, our law knows no such limits and our courts have consistently refused to fix one. In the case of *Clark v. Clark* the President, Lord Merriman, refused to hold that a child was illegitimate which survived after an apparent pregnancy of 174 days. At the other end of the scale the court held in *Gaskill v. Gaskill* that 331 days was not too long a pregnancy to admit as possible. Even this record was broken in the recent case of *Wood v. Wood*.

A wife summoned her husband before the justices for desertion. The husband's defence was that he was



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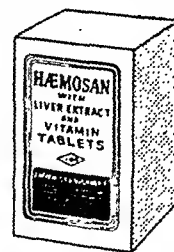
properties of Liver Extract and they have both been incorporated in these tablets in order to give the maximum effect.

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not bound to continue to live with his wife because she had committed adultery. Evidence was given of the last date on which the couple actually cohabited, and of the birth of a child, fully grown and somewhat over the average weight, 346 days afterwards. The husband called no evidence of any association between the wife and other men, but maintained solely in view of the length of the gestation that the child could not be his. The magistrate, rightly considering that the allegation of adultery is serious and must be strictly proved, refused to assume adultery on the gestation period alone, but accepted the evidence of the wife denying it.

The president of the Divorce Court, hearing the husband's appeal, agreed that there must come a point at which any judge must take judicial knowledge of the fact that the period is altogether outside what is possible, and also that one case or another must be on the wrong side of any line that can possibly be drawn. He absolutely declined however, on the information before the court, to say that it was bound to hold that 346 days was on the wrong side of any line that could possibly be drawn and that the wife had committed adultery. The court also held that, although the husband believed that the wife had committed adultery and that he was not the father of her child, he had nevertheless deserted her, because his belief was not induced by such an act on her part as would lead a reasonable person to believe that she was guilty of adultery. It therefore upheld the order of the justices requiring the husband to maintain the wife.

Reviews

ESSENTIALS OF MEDICINE.—By Charles Phillips Emerson, Jr., A.B., M.D., and J. E. Taylor, R.N., B.S., M.Ed. Fifteenth Edition. 1946. J. B. Lippincott Company, Philadelphia and London. Pp. xxii plus 688, with 201 illustrations in black and white and 4 coloured plates. Price, 21s.

This book was first written forty years ago with the object of giving medical students and nurses a general idea of diseases, their treatment and nursing care before they proceeded to more advanced studies. It was not meant as a textbook on medicine but written expressly for beginners so that they may gain as their first impression a clear mental picture of the subject. Judging from the number of editions that have since appeared at regular intervals, it must be fulfilling its purpose well indeed. The present edition has been extensively revised and includes many advances in medicine that have taken place in recent years, e.g. modern methods of chemotherapy, the use of blood and blood substitutes and treatment of various deficiency syndromes. Nursing receives a good deal of attention, and though a description of its technical details is not within the scope of the book, the essential elements have been described in connection with the diseases discussed. The last chapter is a new one and summarizes, in outline form, basic facts concerning therapy, prevention and nursing care of the important diseases. The text has been reset in double column and there are many illustrations. The book presents its material with simplicity and clarity and deserves to be better known in India.

R. N. C.

CHEMICAL METHODS IN CLINICAL MEDICINE: THEIR APPLICATION AND INTERPRETATION WITH TECHNIQUES OF SIMPLE TESTS.—By G. A. Harrison, B.A., M.D., B.Ch. (Cantab.), M.R.C.S. (Eng.), L.R.C.P. (Lond.), F.R.I.C. Third Edition. 1947. J. and A. Churchill Limited, London. Pp. x plus 630, with 5 colour plates and 120 illustrations. Price, 40s.

The main object of the book is to promote the development of a more intimate relationship between

chemistry, physiology and medicine and the perusal of the book will convince the reader that the labours of the author have been well spent in that direction.

The book has been thoroughly revised and the revision of some parts such as the section on cystinuria, clearance tests and liver efficiency tests appears to be very extensive indeed. Many new items have also been included in the present edition but the size of the book has not been much altered evidently due to drastic editing.

The first chapter would prove to be very useful from the point of view of diagrams and detailed notes about apparatus and special instruments such as colorimeters, comparators, microscope, spectroscope, etc.

A new and a very useful chapter (chapter XXVIII) has been added on pigmentation and is illustrated by coloured plates. An entirely new section on sulphonamide and its derivatives describing tests which would help to adjust the dose of the drug in order to maintain an effective concentration in the blood plasma has been added. A useful modification of Yvon's hypobromide method for estimation of blood urea has been described by the author where he has substituted a syringe for the rubber bulb, which appears to be an improvement in that it is easier and safer to handle. Similar additions are found in the sections on aetiology of calculosis, analysis of post-mortem blood and cerebrospinal fluids, copper sulphate, S. G. method of proteins, etc.

J. P. B.

THE M.B., B.S. FINALS. A COLLECTION OF THE PAPERS SET AT THE LONDON M.B., B.S. EXAMINATION FOR THE YEARS 1932-1945, CLASSIFIED AND ARRANGED IN SUITABLE SUB-DIVISIONS.—By F. Mitchell-Heggs, T.D., M.B., B.S. (Lond.), F.R.C.S. (Edn.), Major, R.A.M.C. Third Edition. 1947. J. and A. Churchill Limited, London. Pp. xvi plus 99. Price, 8s. 6d.

This is a collection of the papers set at the London M.B., B.S. examination for the years 1932-1945, classified and arranged in suitable sub-divisions. It also includes extracts from Regulations relating to degrees in medicine and surgery of the University of London. The volume will be of service to those working for the final medical examination.

R. N. C.

THE DOCTOR AND THE DIFFICULT ADULT.—By William Moodie, M.D., F.R.C.P., D.P.M. 1947. Cassell and Company, Limited, London. Pp. vii plus 286. Price, 15s.

This book is intended for the ordinary doctor who wishes to acquire a general knowledge on modern psychiatry but who has neither the time nor the inclination to read the more elaborate textbooks on the subject. At the outset the author defines the scope and limitations of psychotherapy and then proceeds to describe in non-technical language and with many illustrative cases the common mental disorders, e.g. dementia præcox, schizophrenia, anxiety neurosis, obsessional states, hysteria, neurasthenia, epilepsy and mental defect. Then follows a chapter on the planning of interviews between the psychiatrist and his patient on which so much depends towards the progress of the case. Treatment in itself is divided into two parts, general, including medical, surgical and shock therapy and narco-analysis, and psychological, in which sufficient details are given of the principles and management of the patient. The last chapter is on the 'healthy person', i.e. on mental health, a subject which has attracted a good deal of attention in recent years and in which the author makes some common-sense observations. The book is obviously based on his own clinical experience, and being free from jargon and theoretical discussions, it is quite suitable to general practitioners.

R. N. C.

A TEXTBOOK OF BACTERIOLOGY.—By R. W. Fairbrother, M.D., D.Sc. (Man.), F.R.C.P. (Lond.). Fifth Edition. 1946. William Heinemann (Medical Books) Limited, London. Pp. viii plus 480. Illustrated. Price, 17s. 6d.

In the new edition this textbook has been thoroughly revised. The many important developments in bacteriology made during recent years have been incorporated and obsolete material removed. Each chapter is complete and written in a simple lucid language which makes for easy reading and is eminently suitable for the medical student. This textbook is recommended as one of the best amongst the large number available on the subject.

C. L. P.

GENERAL BACTERIOLOGY: LABORATORY MANUAL.—By L. S. McCune. 1946. W. B. Saunders Company, Philadelphia and London. Pp. ix plus 106. Illustrated. Price, 6s. 6d.

This manual is designed as a work book of laboratory exercises for classes in bacteriology. The sixty-one exercises illustrate the fundamental principles of practical bacteriology. Each exercise is on a uniform plan—following a brief description of the purpose of the exercise and the list of the materials required for it the procedure of work is given in detail. Space is provided for further notes and to record the results in well-designed blank forms. At the end of the book are four useful appendices dealing with the microscope, stains and reagents, culture media and notes on general laboratory technique. This manual will be of value not only to the student but also to the teacher who will find in it much that will help him in planning the practical class work of introductory bacteriology.

C. L. P.

HANDBOOK OF PRACTICAL BACTERIOLOGY: A GUIDE TO BACTERIOLOGICAL LABORATORY WORK.—By T. J. Mackie, C.B.E., M.D., D.P.H., and J. E. McCartney, M.D., D.Sc. Seventh Edition. 1945. E. and S. Livingston, Limited, Edinburgh. Pp. viii plus 720. Illustrated. Price, 17s. 6d.; postage, 7d.

Since its first publication in 1925, this popular and trusted book of practical bacteriology through its various editions has been available as an up-to-date book of study and reference. In the present edition are incorporated new contributions to bacteriological knowledge and technique developed during the war. Much of this is contained in the appendix—a feature introduced in the sixth edition—which reviews and stresses the importance of the advances made during recent years.

This new edition fully maintains and enhances the high reputation of its predecessors and can be recommended as one of the best books on practical bacteriology.

C. L. P.

AIDS TO BACTERIOLOGY.—By H. W. Scott-Wilson, B.Sc., B.M., B.Ch. (Oxon.). Seventh Edition. 1946. Baillière, Tindall and Cox, London. Pp. vii plus 300. Price, 6s.

This seventh edition of this number of the Student Aids Series has been revised and by the deletion of old and unimportant material new matter has been introduced without any material change in the size of the book. A great deal of obsolete and unnecessary material still remains and certain important groups of organisms are inadequately described. As an example of obsolete material it is stated in the chapter on cholera that in the bacteriological diagnosis of the disease amongst other tests the pathogenicity of the organism is determined by intraperitoneal inoculation of a guinea-pig which if the organism is *V. cholera* will die in 24 hours (p. 158) and on the next page 'the vibrio is identified with certainty by the agglutinin absorption test and by Pfeiffer's reaction'. The generally accepted definition of the cholera vibrio is nowhere given. The group of organisms of particular

interest in the tropics are as a whole inadequately dealt with. This is a book that cannot be recommended to the medical student of India.

C. L. P.

PRACTICAL HANDBOOK OF THE PATHOLOGY OF THE SKIN.—By J. M. H. Macleod, M.A., M.D., F.R.C.P. (Lond.), and I. Muondo, M.R.C.P. (Lond.), M.B., B.S., B.Sc. (Lond.). Third Edition. 1946. H. K. Lewis and Company, Limited, London. Pp. xix plus 415, with 27 coloured and 125 black and white illustrations. Price, 50s.

This third edition of this valuable and useful book for students of dermatology and pathology has been revised and certain sections amplified. The sub-title—an introduction to the histology, pathology, bacteriology and mycology of the skin with special reference to technique—indicates the scope of this work. It is more than an introduction, it is a complete description. All the important information necessary for the serious student of dermatology is contained in this book. The illustrations of which there are 27 coloured and 125 black and white are excellent and enhance the value of the descriptions. This is a work that will be of great value to all workers in dermatology and pathology.

C. L. P.

MATERIA MEDICA FOR NURSES: A TEXTBOOK OF DRUGS AND THERAPEUTICS.—By W. Gordon Soars, M.D. (Lond.), M.R.C.P. (Lond.). Second Edition. 1947. Edward Arnold and Company, London. Pp. vii plus 246. Price, 5s.

The textbook *Materia Medica for Nurses* should be of great value to all nurses in training. It is written clearly and concisely and includes information about the latest drugs. The chapter on weights and measures and the table of vitamins are particularly useful, but in the new chapter on penicillin there is no mention of its use as a throat spray and inhalation in cases of bronchiectasis. Student nurses studying this book will have a clear understanding of drugs in daily use.

I. S.

ANATOMY AND PHYSIOLOGY FOR NURSES.—By J. L. Hamilton-Patterson. 1946. H. K. Lewis and Company, Limited, London. Pp. vii plus 173, with 102 illustrations. Price, 9s.

ANATOMY AND PHYSIOLOGY FOR NURSES is a well-planned textbook. The diagrams, 102 in all, are exceptionally clear and the appendix giving the meaning of anatomical words is most useful. It is one of the few textbooks of its kind that describe anatomy and physiology as a whole, and not in the old-fashioned way of one system at a time.

I. S.

AIDS TO TROPICAL HYGIENE.—Edited by Nicholls Lucius, C.M.G., M.D., B.C., B.A. (Cantab.). Third Edition. 1946. Baillière, Tindall and Cox, London. Pp. xli plus 217. Illustrated. Price, 6s.

COMMENCING from small beginnings the scope of public health as an organized community effort has progressively expanded almost indefinitely. To encompass such a vast field within less than 220 small sized pages is indeed a great task and this small book accomplishes this task admirably. Obviously it was necessary to omit much desirable matter and specially the details which were of particular interest to early sanitarians and which used to form bulk of old standard books. In making his selection the author has exercised good judgment. It should, however, be understood that these remarks apply in respect of public health in Great Britain, not in our own country. There is indeed considerable amount of basic knowledge which is of interest to public health workers all over the world but as an organized community effort, public health must take different courses in accordance with local requirements. The book should, however, serve as a model for our Indian authors to present factual

data and practices in an authoritative, accurate and concise form, with a discussion of principles.

R. B. L.

BOOKS RECEIVED

Anæsthesia: Journal of the Association of Anæsthetists of Great Britain and Ireland. Volume 2. July 1947. No. 3. Published quarterly by the Association of Anæsthetists of Great Britain and Ireland, 45, Lincoln's Inn Fields, London, W.C.2, England. Price, Single copies 10s. each, post free. Annual subscription £2, post free.

Awake: A Journal. Volume XXVIII, 8th August, 1947, No. 15, and 22nd August, 1947, No. 16. Published semimonthly by Watchtower Bible and Tract Society, Inc., 117, Adams Street, Brooklyn 1, N.Y., U.S.A. Yearly subscription, \$1.

Ophthalmology being Section XII of *Excerpta Medica*: A complete monthly abstracting service of the world medical literature comprising 15 sections and covering the whole field of theoretical and clinical medicine under the general editorship of N. W. Woerdeman, M.D., F.R.N.A.S., A. P. H. A. De Kleyn, M.D., F.R.N.A.S., and W. P. C. Zeeman, M.D. Volume I, No. 1. Section XII, May 1947. Published by Excerpta Medica Limited, 111, Kalverstraat, Amsterdam-C., The Netherlands.

Dermatology and Venereology being Section XIII of *Excerpta Medica*. Volume I, No. 2, May 1947. Published by Excerpta Medica Limited, 111, Kalverstraat, Amsterdam-C., The Netherlands.

Radiology being Section XIV of *Excerpta Medica*. Volume I, No. 1, June 1947. Published by Excerpta Medica Limited, 111, Kalverstraat, Amsterdam-C., The Netherlands.

Excerpta Medica: Fifteen Journals containing abstracts of the World's Literature in the Field of Clinical and Theoretical Medicine. Published by Excerpta Medica Limited, 111, Kalverstraat, Amsterdam-C., The Netherlands.

The U.S. Fights Cancer: The Cancer Programme of the National Cancer Institute. Published by the National Institute of Health, U.S. Public Health Service, Bethesda, Maryland.

The Eleventh Annual Report of the Coimbatore District Tuberculosis Sanatorium Society for the period 1st April, 1946 to 31st March, 1947.

Abstracts from Reports

ANNUAL REPORT ON THE WORKING OF THE ASSAM MENTAL HOSPITAL, TEZPUR, FOR THE YEAR 1945. BY S. L. BHATIA, C.I.E., M.C., M.D., F.R.C.P., I.M.S., INSPECTOR-GENERAL OF CIVIL HOSPITALS, ASSAM

THE total number of patients treated during this year was 700 (606 males and 94 females) including 558 remaining from the previous year. Of this number 9 were discharged cured, 26 were discharged improved and 31 died. The daily average strength was 588. Schizophrenia including dementia præcox and mental depression insanity were the commonest causes of the disorders. Patients were employed in gardening and miscellaneous jobs. The proposal for appointment of an occupational therapist is under consideration. The institution has a high rate of sickness and mortality. Of the 31 deaths 6 were due to dysentery and 6 to tuberculosis. In the previous two years these two diseases had caused 117 and 55 deaths respectively. Obviously sanitation is in bad state; the water supply is as insufficient as two decades ago, there is no provision for segregating dysentery cases, disinfection is in a very unsatisfactory state, and there is

constant absconding of keepers and sweepers. Other needs of the institution are convalescent home, a recreation hall with library, provision of nurses and sisters, and increase in the superior staff. The Inspector-General of Civil Hospitals concludes, 'This institution, though styled Mental Hospital, is still in mixed state of prison, an asylum and a mental home. In order to modernize it a good deal of improvement is necessary. . . . The attitude of the general public towards lunacy is still very crude and the medical profession for lack of sound training is inclined to look upon psychiatry as a kind of pathological curiosity; so a propaganda programme to educate the public and to cope with the apathy and lack of understanding in the medical profession is the first essential thing'. (And may we suggest that three rupees is too high a price for a report of 16 pages?)

R. N. C.

ANNUAL REPORT OF THE PROVINCIAL BLOOD TRANSFUSION SERVICE (BLOOD BANK), MEDICAL COLLEGE HOSPITAL, CALCUTTA, 1945-46

THIS service was inaugurated in 1924 in the Imperial Serologist's Laboratory, Calcutta, and later expanded and formed, with the collaboration of the Red Cross Society of Bengal, into what constituted the first blood bank in India. In 1941 it was taken over by the Government of India, enlarged for war purposes and housed in the All-India Institute of Hygiene and Public Health, Calcutta, and in 1945 it was handed over to the Government of Bengal for peace-time work. Its report for the year 1945-46 has just been issued.

The Blood Bank which is now situated in the Calcutta Medical College is open daily at certain hours to emergency cases. Blood is supplied to hospital patients (civil and military) either in exchange for blood donated to the bank or on payment of a fee of Rs. 25 to Rs. 40, but during the year a large quantity of blood was supplied free to indigent patients. Stocks of serum have been issued to meet emergent requirements in the more important hospitals. Training in transfusion is given to doctors, the course extending over a full week. A panel of trained doctors is kept from willing private practitioners, and these are recommended when a request is received for transfusion at a private house.

Much propaganda work has been necessary to make the organization a success, and among other measures Red Cross badges and bars indicating the number of bleeding are awarded to donors. A donor becomes eligible for a silver medal after ten donations of blood, and the award is made at a formal ceremony at Government House. The last investiture ceremony was held in January 1946 when 42 donors were presented with silver medals. Here it is worth mentioning the name of Captain M. Sh. C. Hannah who donated blood 50 times since 1942. Another donor transferred from the Bombay register donated 139 times. None of them had any ill effects. During the year 6,835 donors were bled and half of them were military personnel. Other sources were blood bank clinic, special clinics (i.e. special collection centres to suit the convenience of donors), mercantile firms and jail convicts. During the Calcutta disturbances about 400 students donated their blood in response to appeals issued through the press. In addition a panel of donors was maintained for catering to the needs of those who preferred to use blood directly from donors instead of stored blood or blood substitutes. There are about 122 donors on the panel who charge Rs. 50 from the patient for one donation of 300 c.c. of blood.

During the period under review out of 1,614 litres collected 381 litres were issued for whole blood transfusion and 1,233 litres were processed into serum. The demand has been much in excess of the supply, it is now encroaching on the reserve stock. The zeal to donate has slowed down since the termination of the war and of late the bank has been dependent mostly on the military and jails, but here too difficulties are

being experienced. The sale proceeds show that patients are quite willing to pay, but unless the public realize their responsibility, the blood bank cannot maintain its solvency for long.

R. N. C.

SIXTY-FIRST ANNUAL REPORT OF THE NATIONAL ASSOCIATION FOR SUPPLYING MEDICAL AID BY WOMEN TO THE WOMEN OF INDIA FOR THE YEAR 1945 INCLUDING THE THIRTY-SECOND ANNUAL REPORT OF THE WOMEN'S MEDICAL SERVICE FOR INDIA. PRINTED BY THE MANAGER, GOVERNMENT OF INDIA PRESS, NEW DELHI

The report covers the activities of the following units :—

- (a) The original Countess of Dufferin's Fund.
- (b) The Women's Medical Service.
- (c) The Central Office.

The shortage of nurses both trained and under training continued to be acute. The action of the Government of India in sending nurses overseas for post-graduate training in Hospital Administration, Sister Tutor Course and Public Health will to some extent relieve the situation when they return. There are six post-graduate scholarships for these courses, two from the Central Government and four from the Provinces. Thirty-two scholarships have been sanctioned to enable suitable graduates and undergraduates to take four years' training in nursing in the United Kingdom. The introduction of the degree of B.Sc. Nursing by the University of Madras and the inauguration of this course at the Mission Medical College Hospital, Vellore, are a distinct step forward.

The paucity of trained women dispensers and compounders and trainees has also adversely affected the efficiency of our hospitals.

Three women doctors selected for training in Public Health will be sent overseas as soon as travel conditions permit.

THE COUNTESS OF DUFFERIN'S FUND AND THE WOMEN'S MEDICAL SERVICE

Countess of Dufferin's Fund.—Of the recurring income of Rs. 37,241 of the Fund Rs. 6,945 was spent on scholarships and prizes, Rs. 26,801 on grants to Provincial Dufferin Committees and hospitals for improvements. The Gilchrist Trustees, London, have been most generous in continuing their grant of £150 per annum for six scholarships at the Lady Hardinge Medical College.

The Council has 24 scholarships for award to women in the various medical colleges in Delhi, Madras, Bombay, Calcutta, Lahore, Lucknow, Agra, Patna, Cuttack and Vizagapatam. There were 1,273 women undergraduates in these colleges in 1945.

Women's Medical Service.—The work has steadily increased in all the hospitals in spite of trying conditions due to shortage of staff, drugs and finances.

Recruitment continued to be difficult owing to the demands of the army.

CENTRAL OFFICE

The Secretary as inspecting officer for the Women's Medical Service visited during the year all the hospitals under W.M.S. officers including the Lady Hardinge Medical College and Hospital. She also contacted women I.M.S. and I.A.M.C. officers in her capacity as Assistant Director-General, Women's Branch of the I.M.S. It is encouraging to note that in all these hospitals every attempt is being made to improve the out-patient departments and so bring them more into line with the modern conception of such a department, as a consulting, diagnostic and educative centre.

The rest of the report is devoted to accounts of the work done in various branches and hospitals under the fund.

R. N. C.

Correspondence

INFANTILE DIARRHOEA

SIR,—Bearing in mind the dearth of literature on one very important branch of Tropical Medicine, viz. children's disease in tropics, I would request you to try to arrange a series of articles on diarrhoea in infants in India.

My own impression is that hundreds of young infants must die annually from this cause alone in Bengal.

Yours, etc.,

M. MASWOOD KHAN,
MAJOR, M.B., B.S.

CHITTAGONG.

[Papers on the subject will be welcome.—Editor, I.M.G.]

PENICILLIN ADMINISTRATION

SIR,—I have read with interest the questions on 'Storage and Use of Penicillin' preferred by Dr. J. C. Bhattacharjee and the answers from your end published in July 1947 issue of the *Gazette*. I feel a particular concern for the 4th item of the questions and would like to say a few words in so far as my experiences are concerned. I hope you will please give it a publicity in your esteemed journal.

The use of penicillin at three-hourly intervals is not only a problem to the clinician but gravely affects the patient. Comparatively large doses (say 300,000 units in 1 c.c.) can of course be administered by the use of penicillin in wax and oil. It is however doubtful if a single injection of penicillin in wax and oil can be depended upon in the control of acute cases. In fact with the delayed absorption, penicillin in wax and oil can never attain a concentration in acute cases lethal to the penicillin susceptible organisms. I, of course, do not dispute the total unit content per cubic centimetre of wax and oil penicillin and I think 300,000 units in 24 hours is fairly sufficient. As a solution to the disadvantage of three-hourly administration and to suit the convenience of both myself and the patient, I started using about a year ago 100,000 units in watery solution three times a day intramuscularly (early morning, noon and the first part of the night). With the evidence of control of the infective process the three administrations were reduced to two (morning and night) and ultimately to a single morning injection before final withdrawal. I have employed this scheme of treatment in twelve of my cases comprising follicular tonsillitis, lobar pneumonia and a single case of acute gonorrhoea. In the first two groups, ten to twelve hundred thousand units were on an average necessary to effect a cure. In the gonorrhoea case (a male) however a total of 24 hundred thousand units were administered to leave the patient as clinically cured. I have now adopted this method of administration as a routine.

Since adopting the above scheme of penicillin administration I have gone through an abstract of discussions (the *Lancet*, 13th September, 1947, p. 397) on penicillin and streptomycin and I find to my satisfaction that Sir Alexander Fleming advocates the injection of very large doses of a watery solution as an alternative to the penicillin in wax and oil.

Yours faithfully,

A. C. DEY, L.M.F.,
Formerly Senior Resident
Medical Officer, Ashtanga
Ayurveda Hospital, Calcutta.

MEPACRINE PSYCHOSIS

SIR.—It does not seem that a full case has been made against mepacrine by Drs. M. S. H. Mody and Nandi writing about mepacrine psychosis in your issue of May 1947, pages 273-274. It is not said whether their cases were clinical or proven by an examination of the blood-films. It would also be necessary to exclude meningitis by making a lumbar puncture before they can dub mepacrine as the causative agent for the psychosis referred to by them.

It is a well-known fact that mepacrine is a slowly acting parasiticide. The doses recommended by the army for the routine use in malaria is 2 tablets t.d.s. for 3 days and one tablet t.d.s. for 4 days for adults—children receiving proportionate doses. Several lakhs of cases were treated on these lines in the army and no definite case of mepacrine psychosis was reported.

We had a few cases with identical symptoms as described by the writers in our patients while on mepacrine treatment. We found that quinine bishydrochloride gr. v given intravenously once or twice at most cleared the symptoms. We did not stop the oral mepacrine in any case. This would show that 'the psychosis' is a phenomenon of the disease itself and not due to the mepacrine.

Yours, etc.,
V. G. DESAI.

BARSI LIGHT RAILWAY
DISPENSARY,
KURDUWADI.

RIOT SURGERY

SIR.—The statement made by Dr. A. K. Basu in his article 'Experience of Riot Surgery' (*I.M.G.*, August 1947, p. 465) that 'shock for some reasons is conspicuously absent in these cases in the first few hours (Som and Mukherjee, 1947). In my experience this is dangerous teaching', is utterly untrue and misleading.

We never said that shock was conspicuously absent in all cases. We said in summary that 'shock in stab wounds was not usually marked'. We also said 'shock was not so marked and constant feature in uncomplicated abdominal cases (unlike what obtains in gun-shot wound of the abdomen)'. We pointed out in table I that out of 25 cases one had severe shock, seven had moderate shock, twelve had mild shock and five had no shock. This was estimated from blood pressure and pulse rate, not from mere guess work. Dr. Basu did not give any statistics of his patients. Moreover, when we discussed shock, we made a comparative statement of stab wound abdomen with that of gun-shot wound abdomen. In gun-shot wound abdomen shock was usually marked. In table III we pointed out that three cases of gun-shot wound abdomen died before operation. The reasons for marked absence of shock were given—like quick transport, absence of laceration of tissues, absence or insignificant gastro-intestinal spillage. Shock was proportional to the amount of hæmorrhage and severity of intra-abdominal visceral damage.

Dr. Basu stressed on resuscitation treatment before operation. We did resuscitation in cases indicated. We said that we used plasma or serum and saline before operation and even we did autotransfusion during operation in suitable cases.

In view of these facts there was no need for Dr. Basu to sit on judgment over other teachers. Incidentally, a casual and uncritical reader can be very 'dangerous' indeed.

Yours, etc.,
ASITA LAL SOM
and

MURARI MOHAN MUKHERJEE.

CAMPBELL MEDICAL SCHOOL
AND HOSPITAL, CALCUTTA.

Service Notes

APPOINTMENTS AND TRANSFERS

LIEUTENANT-COLONEL JASWANT SINGH, Deputy Director, Malaria Institute of India, Delhi, is appointed Director of the Institute, with effect from the afternoon of the 9th August, 1947.

Lieutenant-Colonel T. C. Puri was appointed to officiate as Public Health Commissioner with the Government of India from the 6th August, 1947 to the 14th August, 1947.

Lieutenant-Colonel E. T. N. Taylor, C.I.E., lately Additional Deputy Director-General, Indian Medical Service (Personnel), is appointed temporarily as Officer on Special Duty (Records) in the office of the Director-General of Health Services with effect from the 15th August, 1947.

Lieutenant-Colonel C. Mani, Additional Deputy Director-General of Health Services, was placed on deputation to Europe from the 21st August, 1947 to 21st September, 1947.

Lieutenant-Colonel B. S. Nat, Inspector-General of Civil Hospitals, East Punjab, to be a member of the Medical Council of India from the East Punjab, with effect from the 27th October, 1947.

The services of Major F. M. Khan, Port Health Officer, Calcutta, were placed at the disposal of the Government of Bengal, with effect from the 24th June, 1947.

Major M. S. Chadha, Assistant Chief Health Officer, Delhi Province, is appointed to officiate as Chief Health Officer, Delhi Province, with effect from the afternoon of the 14th August, 1947, *vice* Lieutenant-Colonel B. N. Khan.

Major T. R. Bargartra is appointed Medical Adviser (Pensions) (D.A.D.M.S.), Ministry of Defence (Pensions Branch). Dated 4th September, 1947.

The services of Major P. M. Kaul, Additional Deputy Director-General of Health Services (Epidemic and Communicable Diseases), are placed at the disposal of the World Health Organization Interim Commission with effect from the 24th October, 1947.

Major R. N. Mitra is appointed Medical Adviser (Pensions) (D.A.D.M.S.), Ministry of Defence (Pensions Branch). Dated 31st October, 1947.

Major L. M. Hogg is appointed Medical Adviser (Pensions) (D.A.D.M.S.), Ministry of Defence (Pensions Branch). Dated 1st November, 1947.

LEAVE

Lieutenant-Colonel E. A. O'Connor, Chief Medical Officer in the Western India and Gujarat States Agencies and Residency Surgeon, Rajkot, is granted war concessional leave in India for 1 month and 16 days, combined with leave on average pay for 8 months and half-average pay for 1 year 4 months and 28 days, with effect from the afternoon of the 14th August, 1947, pending retirement.

Lieutenant-Colonel Milne, Administrative Medical Officer in Rajputana and Residency Surgeon, Abu, is granted war concessional leave in India for 1 month and 15 days, combined with leave on average pay for 8 months and on half-average pay for 1 year and 2 months and 16 days, with effect from the afternoon of the 14th August, 1947.

Lieutenant-Colonel W. J. Mody, an Agency Surgeon, is granted war concessional leave in India for 1 month and 16 days, combined with leave on average pay for 8 months and on half-average pay for 1 year, 6 months and 14 days, with effect from the forenoon of the 15th August, 1947, pending retirement.

Lieutenant-Colonel H. W. Farrell, Chief Medical Officer in Central India and Residency Surgeon, Indore, is granted war concessional leave in India for 1 month and 16 days, combined with leave on average pay for

8 months and half-average pay for 1 year, 6 months and 14 days, with effect from the 15th August, 1947, pending retirement.

Lieutenant-Colonel D. Mac D. Fraser, C.I.E., lately Director of Health Services, Delhi Province, is granted combined leave for 2 years and 4 months, namely, war concessional leave on average pay for 1 month and 16 days, leave on average pay for 8 months and leave on half-average pay for 1 year, 6 months and 14 days preparatory to retirement, with effect from the 15th August, 1947.

Major P. J. Wormald, lately Assistant Director, Central Research Institute, Kasauli, is granted leave on average pay for 8 months, combined with leave on half-average pay for 1 year, 2 months and 24 days preparatory to retirement, with effect from the 2nd April, 1947.

Major B. A. Porritt, lately Assistant Director-General, Indian Medical Service (Stores), is granted a further extension of leave on half-average pay preparatory to retirement up to the 10th May, 1948.

Major C. L. Greening, lately Assistant Director, Central Research Institute, Kasauli, is granted combined leave for 1 year, 10 months and 12 days (*viz.* 8 months on average pay, and 1 year, 2 months and 12 days on half-average pay) pending retirement with effect from the 4th August, 1947.

Major G. P. Charlewood, lately Civil Surgeon, Ajmer, is granted combined leave preparatory to retirement for 28 months (*viz.* leave on average pay for 8 months and leave on half-average pay for the balance), with effect from the 15th August, 1947.

Major B. Temple-Raston, lately Civil Surgeon, Simla, East, is granted combined leave preparatory to retirement for 2 years and 4 months (*viz.* leave on average pay for 8 months and leave on half-average pay for the balance), with effect from the 15th August, 1947.

Major H. B. Wright, lately Assistant Director-General, Indian Medical Service, is granted combined leave preparatory to retirement for 1 year, 5 months and 16 days (*viz.* leave on average pay for 8 months and leave on half-average pay for the balance), with effect from the 1st September, 1947, with permission to prefix Sunday, the 31st August, 1947, to his leave.

Captain R. Passmore, lately Assistant Director, Central Research Institute, Kasauli, is granted combined leave *ex-India* preparatory to retirement for 28 months consisting of leave on average pay for 8 months and the balance on half-average pay with effect from the 18th December, 1946.

PROMOTIONS

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captains to be Majors

- E. Dikshitulu. Dated 21st September, 1946.
- R. C. Swaminarayan. Dated 12th January, 1947.
- S. S. Maitra. Dated 3rd February, 1947.
- N. Takar. Dated 5th February, 1947.
- S. N. C. Bona. Dated 5th February, 1947.
- H. K. Sasu. Dated 5th February, 1947.

Lieutenant to be Captain

- S. N. Mazumdar. Dated 20th January, 1946.

RELINQUISHMENTS

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Lieutenant-Colonel. His services were replaced at the disposal of the Bengal Government with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

- Lieutenant-Colonel G. Ahmed. Dated 4th September, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Lieutenant-Colonel :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

- Ty. Lieutenant-Colonel Manmohan Nath Khanna. Dated 22nd March, 1947.

- Lieutenant-Colonel Vaman Belsare. Dated 15th July, 1947.

- Lieutenant-Colonel Arthur Norman De Monte. Dated 7th August, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

- Major Manmatha Nath Ghosh. Dated 5th October, 1946.

- Ty. Major Ambrose Jeyaraj Veda-Nayagam. Dated 22nd October, 1946.

- Major Santosh Kumar Bose. Dated 18th November, 1946.

- Ty. Major Amar Kumar Ghosh. Dated 13th December, 1946.

- Ty. Major A. C. Sreedharan Nambiar. Dated 14th December, 1946.

- Major Sudhir Kumar Das. Dated 21st December, 1946.

- Ty. Major Maddulloori Wilson William. Dated 17th November, 1946.

- Major Ashutosh Das. Dated 23rd December, 1946.

- Ty. Major Gnanadikham Victor. Dated 21st February, 1947.

- Major T. V. R. Wariyar. Dated 22nd March, 1947.

- Major P. N. Chuttani. Dated 30th April, 1947.

- Ty. Major C. J. David. Dated 15th May, 1947.

- Major M. R. Vesuna. Dated 31st May, 1947.

- Ty. Major Kundan Lal. Dated 26th June, 1947.

- Major P. L. Burman. Dated 26th June, 1947.

- Major V. D. Kirpekar. Dated 26th June, 1947.

- Ty. Major P. R. K. K. A. Kasim. Dated 15th July, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

- Major Ignatius James Yu-Chieh Hsu. Dated 25th June, 1946.

- Major Tarak Jiban Gupta. Dated 9th July, 1947.

- Captain Meethan Bhanu. Dated 10th January, 1947.

- Major Tarakad Ramakrishna Aiyar Vaidya Nath.

- Dated 26th April, 1946.

- Ty. Major Puthucode Sahasranamier Anantharaman.

- Dated 4th August, 1947.

- Ty. Major Thoppilchandy Varghese. Dated 18th November, 1946.

- Major Jacob. Dated 30th June, 1947.

- Major Vittaldas Boochappa Naidu. Dated 5th July, 1947.

The undermentioned officers are permitted to relinquish their commissions on reversion to I.A.M.C. (S.M.S.) :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

- Major Patrick Frank Fanaken. Dated 20th June, 1946.

- Major N. Narasimhan, Medical Adviser (Pensions) (D.A.D.M.S.), Ministry of Defence (Pension Branch) relinquished the appointment, 7th November, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services

were replaced at the disposal of the Government of Madras with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain C. S. V. Subramaniam. Dated 8th February, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are replaced at the disposal of the Government of N.W.F.-P. with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain I. A. Khan. Dated 21st March, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services have been replaced at the disposal of the Government of Bengal with effect from the date specified :—

(Emergency Commission)

Captain S. C. Ghosh. Dated 5th April, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captain Asikkadu Ramanathia. Natarajan. Dated 13th May, 1946.

Captain Anza Janakamohun Rao. Dated 4th June, 1946.

Captain Syed Mahmud Hassan. Dated 10th July, 1946.

Captain Puttiah Rama Raju. Dated 15th August, 1946.

Captain Anilendra Nath Das Gupta. Dated 31st August, 1946.

Captain I. Z. Thomas. Dated 4th March, 1947.

Captain B. L. Somway. Dated 6th February, 1947.

Captain G. K. M. Atluri. Dated 28th April, 1947.

Captain K. Z. Aziz. Dated 31st May, 1947.

Captain K. S. Grewal. Dated 22nd April, 1947.

Captain C. M. Yasin. Dated 25th May, 1947.

Captain D. Chatterjee. Dated 4th June, 1947.

Captain M. Singh. Dated 26th June, 1947.

Captain J. A. Danasamy. Dated 28th June, 1947.

Captain K. J. Majumdar. Dated 30th June, 1947.

Captain L. R. Mankodi. Dated 21st July, 1947.

Captain R. Narayanan. Dated 24th July, 1947.

(WOMEN'S BRANCH)

Captain (Miss) Simantini Balkrishna Kekre. Dated 26th June, 1947.

Captain (Miss) Phiroza Santook Davar. Dated 26th June, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services are placed at the disposal of the Government of Bangalore from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain F. P. Mascarenhas. Dated 15th June, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captain Ayalasomayajula Narasimham. Dated 26th April, 1946.

Captain Manickam Parson Jasudasan. Dated 6th July, 1946.

Captain Paresch Chandra Ghosh. Dated 10th September, 1946.

Captain P. Thanarathnam. Dated 11th September, 1946.

Captain P. S. K. Viswanathan. Dated 2nd October, 1946.

Captain Kattoju Paidilingam. Dated 4th November, 1946.

Captain Girdhar Guppur Pradhu. Dated 22nd November, 1946.

Captain Ram Swarup Verma. Dated 23rd November, 1946.

Captain N. Narayan. Dated 21st December, 1946.

Captain G. P. Ramayya. Dated 16th January, 1947.

Captain Rash Behari Mukerjee. Dated 17th February, 1947.

Captain P. P. Ghosh. Dated 14th March, 1947.

Captain Rabindra Nath Mitra. Dated 3rd April, 1947.

Captain Ganapathiagrasharam Subramania Krishna-murti. Dated 5th April, 1947.

Captain A. J. Ribeiro. Dated 12th June, 1947.

Captain M. A. Paul. Dated 1st July, 1947.

Captain D. H. Rajan. Dated 10th July, 1947.

Captain G. S. Majumdar. Dated 10th July, 1947.

Captain R. N. Gupta. Dated 11th August, 1947.

Captain George William Lewis Disena. Dated 12th August, 1947.

Captain M. H. Arbas. Dated 12th August, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captain P. C. S. Nedungadi. Dated 21st March, 1946.

Captain Kaveripakam Umapathi. Dated 26th April, 1946.

Captain P. P. Paulose. Dated 17th November, 1946.

Captain N. P. M. Nair. Dated 19th November, 1946.

Captain Kiran Chandra Ghosh. Dated 30th November, 1946.

Captain S. C. Paul. Dated 16th January, 1947.

Captain A. A. Porinchu. Dated 4th February, 1947.

Captain P. B. Pandhey. Dated 9th May, 1947.

Captain S. Mukherjee. Dated 7th July, 1947.

Captain K. Prasad. Dated 14th July, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service and is granted the honorary rank of Captain. His services have been replaced at the disposal of I.G.C.H. Punjab from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain A. Ghatu. Dated 9th January, 1947.

The undermentioned officer is permitted to relinquish his commission on reversion to I.A.M.C. (S.M.S.) :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain H. B. Gibson. Dated 9th January, 1947.

The undermentioned officer is permitted to relinquish his commission on grounds of ill health and is granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain S. D. Ray. Dated 5th February, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captain Ayiranazhi Covilakath Kutty Kunhan Raja. Dated 17th June, 1947.

Captain Sureshwar Prasad Jha. Dated 2nd August, 1947.

INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)
(WOMEN'S BRANCH)

Captain (Miss) Zubaida Haji Yousof Sobani. Dated 13th May, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commissions)

Captain Vinayak Vaman Pradhan. Dated 31st May, 1946.

Captain G. L. Bawa. Dated 14th August, 1946.
Captain R. N. Mitra. Dated 14th August, 1946.
Captain H. A. Garstin. Dated 25th August, 1946.
Captain G. D. Pillai. Dated 30th August, 1946.
Captain L. C. Waderha. Dated 31st August, 1946.
Captain Pramod Kumar Pal. Dated 26th September, 1946.

Captain N. Alam. Dated 18th October, 1946.
Captain P. I. Alexander. Dated 24th October, 1946.
Captain B. N. Patra. Dated 27th October, 1946.
Captain S. K. Dutta. Dated 27th October, 1946.
Captain G. L. C. Bhajekar. Dated 3rd November, 1946.

Captain G. V. Parikh. Dated 26th November, 1946.
Captain S. V. Garde. Dated 11th January, 1947.
Captain A. P. Bedell. Dated 15th March, 1947.
Captain V. R. Rao. Dated 20th March, 1947.
Captain S. R. Paul. Dated 21st June, 1947.
Captain (Ex-Flt. Lt.) W. U. Khan. Dated 4th July, 1947.

Captain Kandukur Prabhakaram. Dated 5th July, 1947.

Captain Arumbalkam Vishvanathier Rajagopalan. Dated 7th July, 1947.

Captain Leonard Subestain Zuzarte. Dated 20th July, 1947.

Captain Nironjan Choudhuri. Dated 26th July, 1947.
Captain Sisir Kumar Chatterjee. Dated 2nd August, 1947.

Captain Abdur Rahim. Dated 10th August, 1947.
Captain Jagdish Singh Sarkaria. Dated 12th August, 1947.

Captain Krishnagiri Bheemsena Krishnaswami Rao. Dated 18th August, 1947.

(WOMEN'S BRANCH)—(WITHIN INDIAN LIMITS)

Captain (Miss) Dulcie Teresa Dias. Dated 26th June, 1947.

Captain (Miss) Munawer Sultana Sheikh. Dated 12th July, 1947.

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WOMEN'S SERVICES IN INDIA—INDIAN MEDICAL SERVICE
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(Emergency Commissions)

Captain (Miss) Dorothe Fraser Macbean. Dated 26th July, 1947.

Captain (Mrs.) Harbans Kaur Inderjit Singh (née H. K. Grewal). Dated 27th July, 1947.

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ROYAL INDIAN AIR FORCE—MEDICAL BRANCH

Flt. Lieutenant H. S. Gill. Dated 27th February, 1947.

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INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Captain George Paul Colaco. Dated 19th March, 1947.

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ROYAL INDIAN AIR FORCE—MEDICAL BRANCH

R. Singh Rao. Dated 11th July, 1947.

The undermentioned officer is permitted to relinquish his commission transferred to R.A.M.C. (Short Service Commission) :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
SECONDED TO THE INDIAN ARMY MEDICAL CORPS
(Emergency Commission)

Major R. M. Vanreenan. Dated 27th February, 1946.

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Original Articles

ÆTIOLOGY OF APPENDICITIS

AN EXPERIMENTAL OBSERVATION

By R. NIGAM, M.D., M.S. (Hons.) (Luck.),
F.R.C.S. (Eng.)

Medical College, Lucknow

[This paper is a brief summary of part of a thesis submitted for the degree of M.D. (Pathology), Lucknow University.]

Introduction

APPENDICITIS is one of the commonest and not infrequently one of the most dangerous of the surgical emergencies and there is a good deal of evidence that mild attacks of inflammation of the appendix occur much more frequently than is generally supposed. Our knowledge of the exact pathology and ætiology of the disease is, however, far from complete.

Although appendicitis had been reported in the eighteenth century it received no proper recognition until 1886, when Fitz of Boston described a long series of cases, distinguished it clearly as the commonest cause of perityphlitis and gave it the name now universally adopted. Within twenty years it had attained the position of being the most common of all acute abdominal illnesses. This rapidly increasing menace in the beginning of the present century naturally drew the attention of both the pathologists and clinicians, and vague and fantastic explanations were given. Most of the evidence was clinical and co-incidental. Racial and climatic factors were blamed. The rôle of meat diet with a reduction of cellulose appeared to be a very plausible explanation to the older pathologists for the greater prevalence of the disease in the West and comparative rarity in the more vegetarian East. In fact the earliest experimental work of Wilkie (1914) on cats gave support to this hypothesis. Constipation has been looked upon with suspicion. The abnormal deformities of the appendix such as kinks and twists appeared to play a significant part in the ætiology. Various intestinal parasites, particularly *Oxyuris vermicularis*, have had many advocates in the genesis of appendicular disease.

Early in the twentieth century, with increasing interest in bacteriology, the infective theory in the causation of appendicitis was brought forward, there being two schools of thought—the hæmatogenous and enterogenous. Rosenow (1915) the pioneer of the hæmatogenous theory put forward the view that acute appendicitis was the result of the selective affinity of certain throat streptococci for the appendix. Poynton and Paine (1911) and Adrian (1901) working on the rabbit came to a similar conclusion.

McMeans (1917) and more recently Williams and McLachlan (1930) however have shown that the concentration of bacterial emulsion necessary to produce lesions in the appendix was far too much to occur naturally in human beings. Patey and Whitby (1933) working on the pathology of cholecystitis found no experimental evidence to support Rosenow's theory of elective localization.

Aschoff (1932) on the other hand, by extensive studies of normal and inflamed human appendices, showed that the appendix has a special bacterial flora, the members of which are responsible for the attack; he suggested that in acute appendicitis there is an enhanced virulence of this normal flora brought about probably by stagnation of fæces within it.

Lansdown and Williams (1915) after a histological survey of inflamed appendices came to the conclusion that it was the lymph follicles in the submucosa which were the primary seat of disease in the appendix, and not the mucous membrane, thus lending support to the hæmatogenous theory. Aschoff, however, will have none of it. He has always held that appendicitis is an enterogenous infection arising on the surface of the mucosa and denies the possibility that the disease may ever be blood-borne.

Wangensteen (1937) and his co-workers have investigated the function of the human organ in appendicostomy cases and have stressed mechanical causes as responsible agents in the genesis of inflammations in the vermiform appendix.

A more recent paper on the ætiology of appendicitis is that of Wells (1937) from the Dunn School of Pathology, Oxford. From his work on animals Wells supports the enterogenous origin of the disease.

The present paper contains the experimental part of a thesis on the pathogenesis of appendicitis which was conducted both on clinical and experimental bases.

Experimental work

Observations were made on fifty adult rabbits. The rabbit is the only easily available laboratory animal which has an appendix at all comparable, both in microscopical structure and naked-eye appearance, with that of man. Also appendicitis occurring spontaneously in rabbits has been reported in the literature (Mori, as quoted by Wells, 1937). These were the main reasons for choice of the rabbit in the present investigation.

Experiments were planned to observe the changes produced in the appendices of rabbits under the following conditions:—

(a) Ligation of the root of the appendix by a silk thread avoiding the blood supply of the viscus.

(b) Ligation of the root of the appendix including the appendicular artery and vein in the ligature.

(c) Ligation of the root of the appendix and obstruction of the venous return by ligature of the appendicular vein.



Fig. 1.—Normal appendix of rabbit *in situ*.
(a) Appendix (3 to 4 inches). (b) Cecum.
(c) Terminal ileum. (d) Colon.

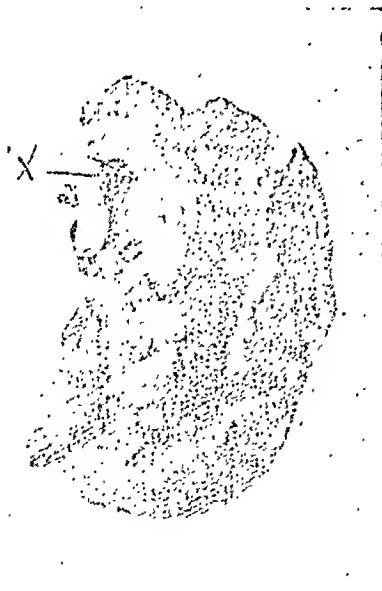


Fig. 2.

Acute appendicitis following complete obstruction by encircling ligature of root ('X'—site of ligature). Adherent and inflamed appendix in each case.

viscus, the point of entry being subsequently sutured by catgut.

(f) Traumatization of mucous membrane followed by introduction of a living emulsion of streptococci into the lumen by a needle passed through the tip.

(g) Introduction of a foreign body in the form of glass beads or large fruit seeds into the lumen of the appendix to observe the effect of intraluminal obstruction. These were introduced into the lumen by incising the root of the appendix and suturing the wall subsequent to the introduction by catgut.

(h) Daily intravenous injections of emulsions of virulent streptococci isolated from the throat of patients suffering from acute tonsillitis. These injections were given daily into the marginal ear vein of the rabbit over a period of 3 to 4 weeks, unless the animal died earlier, after which the appendix was removed for histological examination.

The concentration of the bacterial suspension was estimated by the comparative opacity tube method. The doses varied between 200 and 600 millions/c.c.

Hæmolytic streptococci and *Str. viridans* were employed.

(i) Observations as under (h) in animals with appendices which had been traumatized.

Operations exposing the appendix were done with aseptic precautions and under local procaine* infiltration anaesthesia. The abdominal

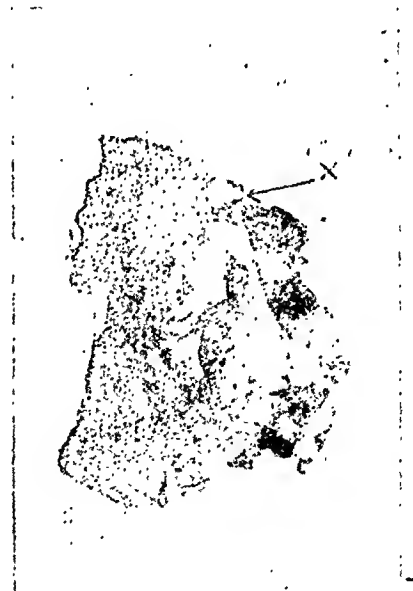


Fig. 3.

(d) Production of abnormal kinks of the appendix.

(e) Traumatization of the mucous membrane of the appendix by scarification with a sharp needle introduced through the tip of the intact

wound was closed in layers with catgut and sealed with collodion. The animals recovered

* We do not like this name which, over the telephone sounds like 'cocaine' while 'novocaine' does not. See this journal, vol. 82, p. 499.—EDITOR, *I.M.G.*

after the operations surprisingly well and operative mortality was very low. Except for two animals which developed a ventral hernia

weeks to a month the appendix was removed for histological examinations, unless the animal had died already of acute appendicular inflammation



Fig. 4.

Acute appendicitis following obstruction by a large foreign body impacted in the lumen ('X'—impacted foreign body has been exposed).

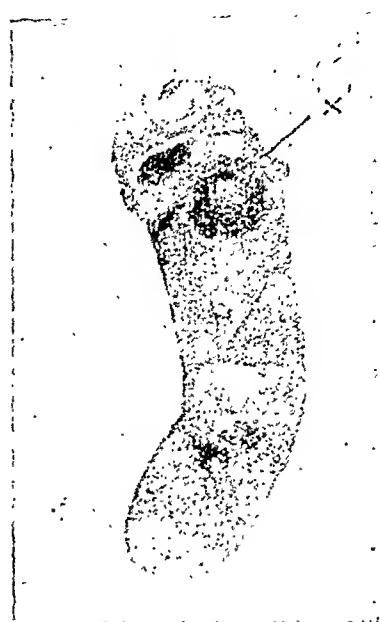


Fig. 5.

the others fared very well. Special procedures adopted in some experiments have been men-

and peritonitis. A post-mortem examination was done on the animals which died.

Observations

(a) Complete obstruction of the lumen of the appendix plays the most significant rôle in the causation of acute appendicitis. The obstruction may be either by a simple ligature of the root of the appendix or by a large foreign body introduced into its lumen. All the animals died of acute appendicitis (figures 2, 3, 4 and 5).

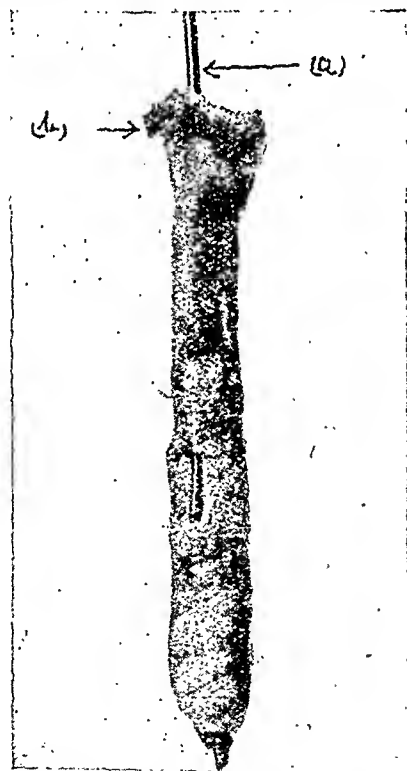


Fig. 6.—Partial obstruction of the appendix, no inflammation. (a) Probe shows patency of lumen. (b) Ligature site.

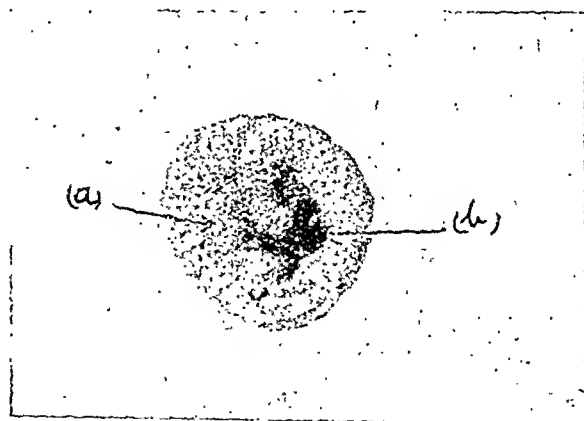


Fig. 7.—Root of appendix (figure 6) viewed end on. (a) Ligatured part. (b) Semilunar patent lumen.

tioned already. The rectal temperature of the animals was recorded and after a period of three

(b) If the obstruction of the lumen was partial, in spite of a similar degree of trauma produced by the ligature, as in animals with complete obstruction of the lumen of the appendix, no inflammation followed (figures 6 and 7).

(c) Almost all the animals with complete ligature or obstruction showed a rising rectal temperature (104 to 105°F.).

Another significant feature observed was that all these animals developed diarrhoea before death.

(d) Trauma to the mucous membrane is not an essential factor in the genesis of acute

(h) Intravenous injections of living emulsions (100 to 600 millions) daily for over 30 days of the same bacteria, in normal rabbits, or those with local trauma to the appendix produce no inflammation in that viscus. The rabbit appears to be immune to these organisms. Except for a rise in temperature no other abnormality was observed.



Fig. 8.

Mucocoele of the appendix ('X'—site of ligature of root and appendicular vein).

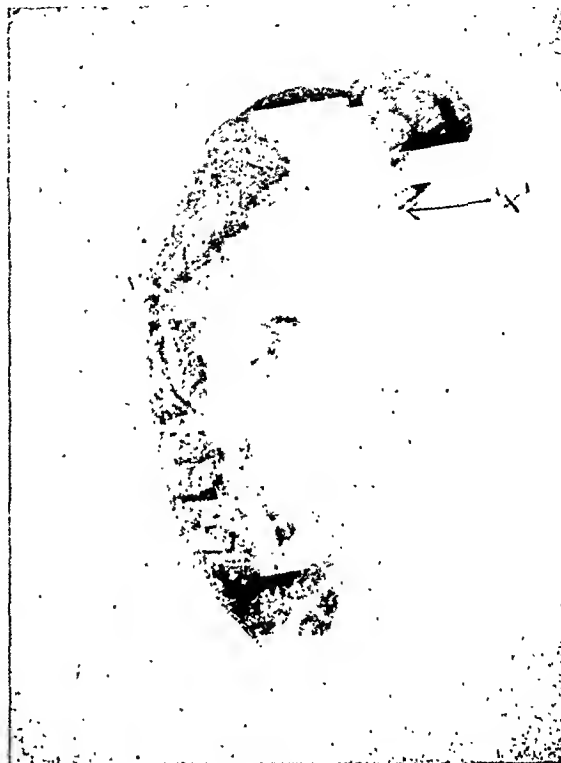


Fig. 9.

appendicitis in addition to obstruction. All my experimental animals with ligature (complete obstruction without trauma to mucous membrane) developed acute appendicitis. I am not in agreement with the statement of Wells (1937) that trauma and obstruction produce appendicitis while obstruction alone produces a mucocoele.

(e) A mucocoele or more exactly pyocoele of the appendix developed in those animals only in which there was a ligature of the lumen of the appendix and an associated obstruction of the venous return produced by ligature of the appendicular vein. The element of vascular stasis in the appendix in addition to complete obstruction of the lumen is necessary for the development of a mucocoele (figures 8 and 9).

(f) Abnormal kinks or twists of the appendix cause no inflammation (figure 10).

(g) Trauma to the mucous membrane of the appendix by itself or with intraluminal introduction of living emulsions of *Str. hemolyticus* or *Str. viridans*. (Doses 1,500 to 2,000 millions/c.c. from the throats of patients suffering from acute tonsillitis produce no inflammation in the rabbit's appendix.)

(i) The rabbit's appendix possesses an active peristaltic movement capable of expelling small



Fig. 10.—Kinked appendix.

foreign bodies into the cæcum. All animals in whom the foreign body was large enough to

produce complete obstruction developed acute appendicitis (figure 11).

(j) Histological examination of the rabbit's normal appendix shows that it resembles the human appendix except for the following histological differences (figures 12 and 13, plate XXVIII):—

1. There is no well defined muscularis mucosæ coat.

2. The submucosa consists of a diffuse mass of lymphoid tissue without the formation of isolated lymph follicles as in the human appendix.

3. The muscle coat is a very thin layer.

(k) Histology of diseased rabbit's appendix resembled that of human appendicitis in the following details:—



Fig. 11.—All four glass beads were passed out of the appendix lumen.

1. Necrosis of mucous membrane, atrophy of lymphoid tissue in the submucosa, and formation of a thick inflammatory exudate involving the muscle and serous coats (figures 14, 15, 16 and 17, plate XXVIII).

2. Localized crushed trauma to the appendix produces a histological picture indistinguishable from chronic appendicitis in human beings (figures 18, 19, 20, 21, 22 and 23, plate XXIX).

(l) The bacterial flora of the rabbit's appendix is similar to the flora in the human appendix. The following organisms were found on culture: *Ps. pyocyaneus*, *B. coli*, *B. subtilis*, and *Clastridium* group.

(m) I have come to believe that in the genesis of acute appendicitis obstruction is the all important factor, and that the enterogenous organisms of the appendix are the ones that set up inflammation.

(n) Although the genesis of acute appendicitis is apparent the cause of chronic appendicitis is still obscure.

Discussion

My observations, to some extent similar to those of Wells in support of the enterogenous origin of acute appendicitis as a result of obstruction, are as follows:—

1. I agree with his conclusion that, in the rabbit, injection of living bacteria, damage to the mucosa, partial cutting off of the blood supply, or partial obstruction of the lumen alone have no effect on the appendix.

2. He mentions that obstruction of the lumen of the appendix by a foreign body has no effect on the appendix. This may be true for small foreign bodies about $\frac{1}{4}$ inch in diameter but all the animals in which I introduced larger bodies, i.e., over $\frac{1}{2}$ inch diameter, developed acute appendicitis with a mortality of 100 per cent.

3. Wells refers to the fact that ligature of the appendicular artery and vein and mesoappendix produces gangrene in the rabbit's appendix but this was not observed by me. There is such a profuse anastomosis among the vessels of the ileum, ascending colon and the appendix that the mere ligature of the appendicular vessels and mesoappendix is not sufficient to produce gangrene. The element of vascular occlusion was experimented on to test the ingenious hypothesis put forward by G. Ricker who advocated that appendicitis is primarily due to vascular disturbances of the organ brought about by reflex irritation of their nerves, a process akin to the 'chill' mechanism of respiratory disorders. In severe cases Ricker contended that the vascular disturbance is sufficiently intense to cause necrosis or infarction of the tissues which then become invaded by microbes from the lumen. This hypothesis as quoted by Aschoff (1932) in his book on appendicitis finds no support from my experimental results. Ligature of the vessels also includes the perivascular sympathetic nerve plexuses but in none of the animals was there any pathological response observed in the appendix. Aschoff himself, however, disagrees with such a hypothesis. He denies that a vascular disturbance is the primary lesion. He believes that such changes are secondary to a bacterial invasion of the surface of the mucosa.

4. Wells states that simple ligature of the root of the appendix produces mucocele of the appendix, and acute appendicitis follows only when the mucosa is traumatized either by crushing or scratching with a sharp needle in an appendix whose lumen has been occluded. For acute appendicitis to develop Wells emphasizes two elements, obstruction and break in mucosal barrier. My experimental results however do not agree with Wells' conclusions. I found that simple ligature of the root of the appendix alone caused acute appendicitis in 100 per cent of the animals. The factor of trauma to mucous membrane was unnecessary. I thought that a ligature may by itself damage the mucosa; and so in a set of animals I tied

the ligature very gently, but in these too the result was acute appendicitis and not mucocele.

5. I however found that of those animals whose appendix root had been ligatured, and the appendicular vessels had also been included in the ligature 60 per cent developed a distended appendix (mucocele). The contents were mucoid matter and pus cells (hence strictly speaking pyocele of appendix, a result of acute inflammation). Mucocele in the strict sense was not produced in any of the animals observed by me. Perhaps the ligature had produced obstruction only of the venous return leaving an intact arterial flow with a higher blood pressure and this caused congestion and increased secretion by the mucous glands. In order to prove this in a set of animals I tied the root of the appendix and carefully ligated the appendicular vein leaving the artery untied, and I found that the majority of these animals developed a distended appendix. Hence in my opinion the element of venous obstruction plus complete occlusion of appendix lumen is essential for the development of distended appendix resembling a mucocele. In my experiments I failed to produce giant mucoceles as stated by Wells or mucoceles in the true sense.

6. I agree with Wells that the hæmatogenous hypothesis advocated by Rosenow (1915) and by Poynton and Paine (1911) has no support from the experimental results on rabbit; at least by using doses of bacteria which would certainly be dangerous to the human subject. Extremely concentrated bacterial emulsions were not tried.

7. The hypothesis put forward by Wangenstein (1937) and his co-workers demonstrating the secretory function of the appendix is supported from my experimental results.

8. My experimental findings are in agreement with the enterogenous hypothesis advocated by Aschoff (1933) as far as the ætiology of acute appendicitis is concerned. The actual infection of the mucosa is, Aschoff holds, independent of any trauma; it occurs, for example, distal to and not in the immediate neighbourhood of a focus of obstruction. It seems to be due to an increase of virulence of the bacteria normally present in the lumen. How this increase of virulence is brought about is quite uncertain, but it depends largely on stagnation of contents. It may be pointed out here that Aschoff attributes stasis only as the all important factor and does not think that a break in mucosal barrier as contended by Wells to be necessary in the causation of acute appendicitis.

The ætiology of chronic appendicitis is still obscure. I have been unable to produce this experimentally and the literature on this subject is also very scanty. Whether this is due to enterogenous infection, or of hæmatogenous origin, one cannot say with conviction. It is this aspect of the disease that shakes the

foundations of both the ardent enterogenous and rather out of date hæmatogenous schools.

Summary

1. A brief review of the various hypotheses about the ætiology of appendicitis is given.

2. Experimental observations were made on fifty young adult rabbits. The main experimental findings with illustrations are given.

3. There was no evidence found to support the hæmatogenous origin of acute appendicitis.

4. Acute appendicitis is undoubtedly due to complete obstruction of the lumen of the appendix either by a constricting ligature or large foreign body. Mucosal damage is not a necessary factor.

5. The organisms cultured from diseased appendices of rabbits were similar to those of normal appendices showing that infection is intrinsic in origin.

6. A histological picture identical to chronic appendicitis in the human being was produced by a crushing trauma to the appendix localized only to the site of injury.

7. Unusual bends or twists of the appendix, repeated daily intravenous or intraluminal injections, of living and virulent streptococci, over a duration of a month in some instances, produced no gross or microscopic lesions confined to the appendix. The rabbit appears to be quite immune to hæmolytic streptococci isolated from the throats of patients suffering from an acute streptococcal infection.

8. Although the ætiology of acute appendicitis is proved to be obstruction, the ætiology of chronic appendicitis is still uncertain.

EXPLANATION OF PLATE XXVIII

Figs. 12 and 13.—Normal rabbit's appendix.

- (a) Mucosa.
- (b) Submucosa.
- (c) Muscle and serosa.

Fig. 14.—Acute appendicitis due to obstruction.

- (a) Necrosed mucosa and atrophy of submucosa.
- (b) Serous coat infiltrated with fibrin and leucocytes.

Fig. 15.—Acute appendicitis obstructive.

Fig. 16.—Magnified area (A), figure 15, shows necrosis and cellular infiltration of mucous membrane.

Fig. 17.—Magnified area (B), figure 15, shows polymorphonuclear infiltration of serous coat.

EXPLANATION OF PLATE XXIX

Fig. 18.—Crushed areas of appendix (X) with a hæmostat. Localized areas of chronic inflammation.

Fig. 19.—Crushed area of appendix (A) shows atrophy of mucosa, fibrosis in submucosa, muscle and serosa.

Fig. 20.—Area (1), figure 19, magnified shows atrophy of mucosa, cellularity and vascularity of submucosa, eosinophils present. (X) Submucosal vessel shows medial hyperplasia.

Fig. 21.—Area (2), figure 19, shows fibrosis and cellularity of submucosa. (X) Submucosal vessel shows medial hyperplasia.

Fig. 22.—Area (3), figure 19, shows fibrosis, cellularity of serous and muscle coats.

Fig. 23.—Normal serous and muscle coats in comparison.



Fig. 12.



Fig. 13

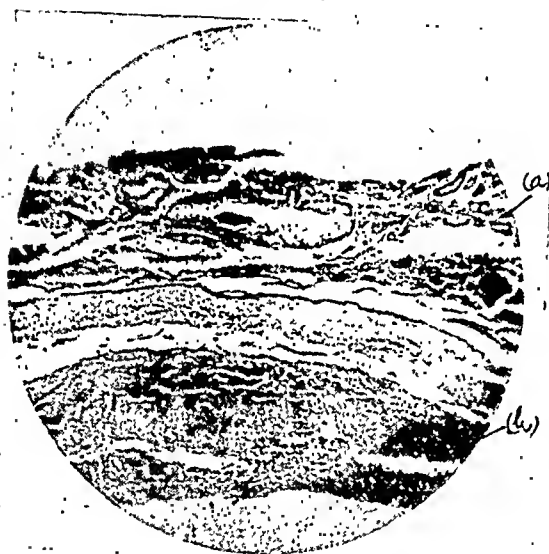


Fig. 14.

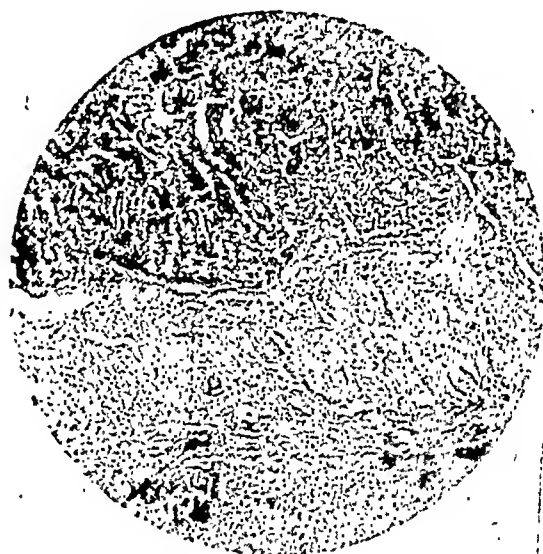


Fig. 15.



Fig. 16.

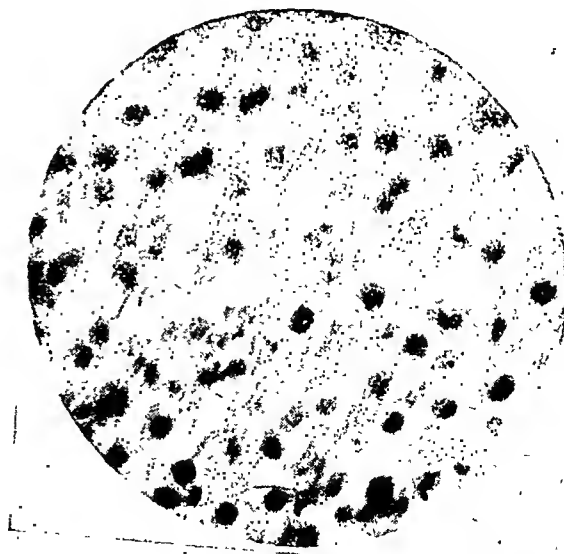


Fig. 17.



Fig. 18.

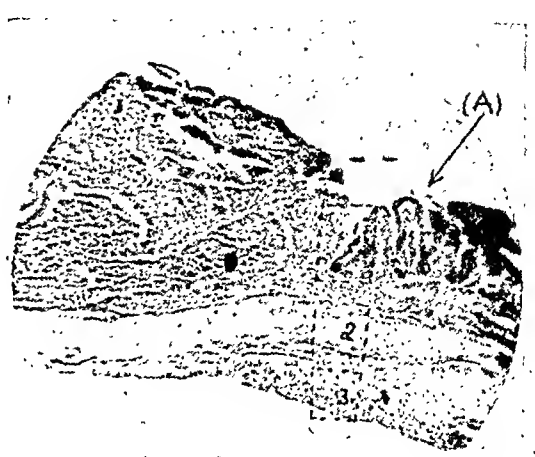


Fig. 19.



Fig. 20.

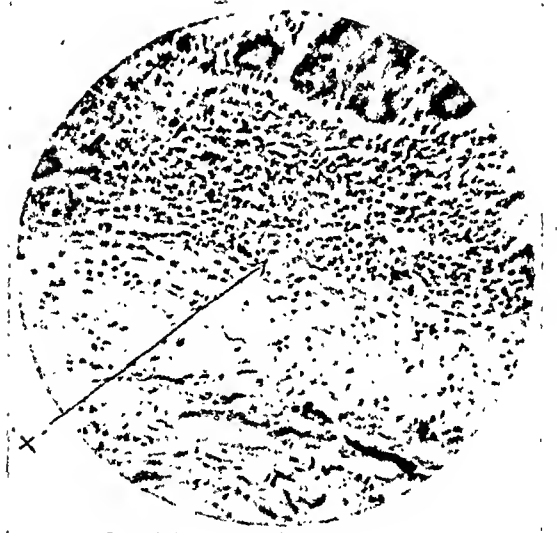


Fig. 21.



Fig. 22.



Fig. 23.

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HISTOPATHOLOGICAL CHANGES IN LIVER IN CONGESTIVE HEART FAILURE

(STUDY BY NEEDLE BIOPSY)

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THE usual textbook description of the changes produced in the liver in chronic venous congestion, the so-called nutmeg liver, are based on the post-mortem findings which obviously could not depict an early picture. The purpose of the present investigations was to study the histopathological changes produced in the liver in ward patients showing various grades of congestive heart failure.

Mallory (1911) demonstrated focal hæmorrhagic necrosis in many livers with severe passive engorgement. Lambert and Allison (1916) in their review of 112 cases from literature, in which chronic venous congestion of the liver was most marked, described in detail many variants from the usual histological picture. Some of their cases showed fatty changes rendering the centre of the lobule yellow with a surrounding red ring as a result of hyperæmia. Other cases showed regeneration of liver cells in the periphery of the lobules. A few cases were conspicuous by changes in the reticular and collagenous skeleton. Eppinger (1920) found bile thrombi in the bile ducts of some of his cases. Boland and Willius (1938) described three general groups of histopathological changes in cardiac livers.

Katzin, Waller and Blumgart (1939) found that in 286 cases, in which death was due to heart failure, the incidence of hepatic fibrosis was three times as great as in 1,714 control necropsies. The incidence and severity of fibrosis increased with the duration of right heart failure. Garvin

(1943) observed 35 cases of cardiac cirrhosis among 790 autopsied patients in whom heart disease was the chief cause of death; while Koletsky and Branebee (1944) reviewed 4,200 autopsies and found 30 such cases for their study. In both these studies cardiac cirrhosis occurred essentially in patients with rheumatic heart disease. It was less frequent in hypertensive patients and rare in other ætiological forms of heart disease except chronic constrictive pericarditis. Both authors came to the conclusion that repeated episodes of decompensation favour the development of the lesion.

Costero and Moguel (1947) in a paper read before the second Inter-American Congress of Cardiology have described the histological changes in the liver during congestive heart failure passing through the following stages:— (a) congestion of the central venules with intense anoxia of the reticular endothelium forming the wall of sinusoidal blood capillaries; (b) hyperplasia of the reticular endothelium forming the wall of sinusoidal blood capillaries; (c) elaboration of precollagenous fibres by this hyperplastic reticular endothelium; (d) intense compression of the trabeculæ through spontaneous retraction of the recently formed fibres with collapse of the intratrabecular bile capillaries and compression atrophy of the liver cells; (e) fragmentation of the trabeculæ into isolated cells; (f) reabsorption of the isolated atrophic cells.

Needle Biopsy of the Liver

The twelve cases selected for the present study were carefully prepared for the needle biopsy of the liver in view of the profuse bleeding from the site of the puncture in chronic venous congestion reported by Hoffbauer (1947). The bleeding, coagulation and prothrombin times of each patient were determined and Kapilin 5 mg. intramuscular injections were given the previous evening and on the morning of the biopsy as a routine. The danger of the symptoms of acute heart failure supervening after the biopsy was realized during the initial part of the investigations; thereafter it was made a rule not to undertake the biopsy unless the patient was completely digitalized. The details of the preparation of the patient, puncture of the liver and after care have been described by Wahi (1946). Vim Silverman needle was used for liver biopsy.

The details of the histological findings along with very brief case reports are given below:—

Case Reports with Histological Findings of Biopsy Tissue

Case 1.—R. P., 50 years, Hindu female, on admission to hospital complained of cough, duration 5 years; shortness of breath, duration 1 year; and cedema of feet, legs and abdomen, duration 1 month. She was diagnosed 'Chronic bronchitis and emphysema with congestive heart failure'. She gave a history of two previous

attacks of congestive failure. Liver enlarged 3 inches. Hippuric acid 0.45 gm.

Histological examination of the liver tissue obtained by biopsy showed the dilated central veins. The sinusoids around most of these were dilated. Liver cells in between the dilated capillaries were compressed and atrophied. Most of the liver cells especially in the midzonal areas showed an extensive cloudy swelling. At a number of places liver cells showed complete necrosis and replacement fibrosis. Hæmorrhages were present due to overwhelming distension of capillaries with venous blood, their rupture and escape of that blood in the intercapillary spaces formerly occupied by the liver cells. At one place there was extensive deposit of bile pigment.

Case 2.—S., 14 years, Hindu male, was admitted to hospital complaining of breathlessness, puffy face, discomfort in abdomen, loss of appetite, vomiting, exhaustion and heavy head, duration 1 month. He was diagnosed 'Rheumatic mitral stenosis and regurgitation with congestive failure'. No previous history of cardiac failure. Liver enlarged 5 inches. Hippuric acid 0.16 gm.

Histological examination of the biopsy tissue showed the most extensive cloudy swelling and fatty degeneration of the liver cells met with in this series. The capillaries did not show much dilatation (figure 2, plate XXX).

Case 3.—R. S., 17 years, Hindu male, on admission complained of breathlessness and cough, duration 2 months; generalized œdema, pain abdomen and loss of appetite, duration 1 month. He was diagnosed 'Rheumatic mitral stenosis and aortic incompetence with cardiac failure'. No previous history of failure. Liver 5 inches enlarged. Hippuric acid 0.30 gm.

Histological examination showed dilatation of sinusoids, cloudy swelling and at places necrosis of liver cells. Blood pigments were present.

Case 4.—K., 22 years, Hindu female, complained of breathlessness, cough and swelling, duration 5 months. She was diagnosed 'Rheumatic mitral stenosis and aortic incompetence with cardiac failure'. No previous history of heart failure. Liver 6 inches enlarged. Hippuric acid 0.54 gm.

Histological examination showed marked dilatation of sinusoids, hæmorrhages, cloudy swelling of midzonal cells and patches of cellular infiltration cells being mostly lymphocytes and fibrocytes (figure 4, plate XXX).

Case 5.—B., 16 years, Hindu male, on admission complained of breathlessness, cough and œdema, duration 1 month. He was diagnosed 'Rheumatic mitral stenosis and aortic incompetence with cardiac failure'. During the last one year he had three previous attacks of congestive heart failure when he was laid up in bed for about a month each time. Liver just palpable. Hippuric acid 0.44 gm.

Histological examination showed dilatation of sinusoids, atrophy of cells surrounding the

hepatic vein, cloudy swelling and fatty degeneration of midzonal liver cells and patches of necrosis. Deposit of biliary pigment was present.

Case 6.—M., 25 years, Hindu female, on admission complained of breathlessness, cough and œdema, duration 6 months. She was diagnosed 'Rheumatic mitral stenosis and regurgitation with congestive heart failure'. The patient had six pregnancies. The first two were uneventful. During the later part of third, fourth and fifth pregnancies she suffered from mild attacks of cardiac failure but they cleared up soon after childbirth each time. During the sixth pregnancy the symptoms appeared from the fourth month and had continued since even after puerperium. Liver 5 inches enlarged. Hippuric acid 0.12 gm.

Histological examination showed marked dilatation of sinusoids, cloudy swelling and atrophy of liver cells (figure 1, plate XXX). There were patches of fibrosis (figure 6, plate XXXI).

Case 7.—P., 40 years, Hindu male; on admission complained of breathlessness, duration 2 months; fainting attacks, duration 1 month, and swelling feet and abdomen, duration 7 days. He was diagnosed 'Primary benign hypertension and atherosclerotic aortic stenosis and incompetence with cardiac failure'. No previous history of heart failure. Liver 2 inches enlarged. Hippuric acid 0.42 gm.

Histological examination of the biopsy tissue showed marked dilatation of sinusoids with cloudy swelling of liver cells. Hæmorrhages could be seen at places. Patches of cellular infiltration were present (figure 5, plate XXXI).

Case 8.—M., 40 years, Hindu female, on admission complained of breathlessness, palpitation and cough with expectoration, duration 18 months. She was diagnosed 'Rheumatic mitral stenosis with auricular fibrillation and congestive heart failure'. She gave a history of one previous attack of failure. Liver just palpable. Hippuric acid 0.64 gm.

Histological examination revealed marked dilatation of sinusoids and atrophy of liver cells. Liver cells showed cloudy swelling with fatty degeneration at many places. Diffuse biliary pigment was present. Patches of cellular infiltration were seen at several places.

Case 9.—R. L., 52 years, Hindu male, on admission complained of cough with expectoration, duration several years; and breathlessness, palpitation and swelling of feet, duration 2 months. He was diagnosed 'Pulmonary tuberculosis, with marked fibrosis and cavitation with congestive heart failure'. He gave a history of one attack of failure 9 months previous to admission. Liver enlarged 2 inches. Hippuric acid 0.55 gm.

Histological examination showed dilatation of sinusoids, atrophy of liver cells, patches of necrosis; patches of cellular infiltration and fibrosis (figure 7, plate XXXI). In some areas

liver cells were swollen, cytoplasm was granular and nucleus pushed to one side. At other places only skeleton of liver cells remained behind and the field was occupied by dilated sinusoids.

Case 10.—M., 30 years, Mohammedan male, on admission complained of breathlessness, general weakness and lack of appetite, duration 1 year; and oedema over face and feet, duration 6 months. He was diagnosed 'Rheumatic mitral stenosis with cardiac failure'. No previous history of failure. Liver enlarged 3 inches. Hippuric acid 0.52 gm.

Histological examination showed dilatation of sinusoids and extensive cloudy swelling. Cellular infiltration was present. Patches of necrosis and definite fibrosis present (figure 8, plate XXXI).

Case 11.—B., 50 years, Hindu male, on admission complained of cough with expectoration, duration 5 years; breathlessness, oedema and abdominal discomfort, duration 1 month. He was diagnosed 'Chronic bronchitis and emphysema with heart failure'. He had twice during the previous years developed the same group of symptoms. Liver 4 inches enlarged. Hippuric acid 0.32 gm.

Histological examination showed dilatation of sinusoids and cloudy swelling.

Case 12.—P., 44 years, Hindu male, on admission complained of breathlessness and oedema, duration 4 months. He was diagnosed 'Chronic bronchitis and emphysema with cardiac failure'. Apart from cough he had kept fairly well in the past. Liver 3 inches enlarged. Hippuric acid 0.28 gm.

Histological examination of the liver tissue obtained by biopsy showed extensive cloudy swelling (figure 3, plate XXX), patches of necrosis and fibroblastic reaction.

Observations and Comments.

According to the histopathological observations these cases may be grouped into four types:—

Type I.—Dilatation of sinusoids with cloudy swelling of liver cells and hæmorrhages due to rupture of distended capillaries (figure 1). These are the earliest changes in passive congestion of the liver. They are invariably found in all cases either alone or in conjunction with other microscopic changes to be described later. The atrophy of liver cells is found adjacent to the central vein of hepatic lobules while the cloudy swelling is much more marked in the areas close to them. Hæmorrhages found in these cases are due to overwhelming distension of capillaries with venous blood, their rupture and escape of that blood in the intercapillary spaces formerly occupied by the liver cells.

Type II.—Liver cells showing extensive cloudy swelling and fatty degeneration with or without much dilatation of sinusoids (figures 2 and 3). Anoxæmia is so advanced in case 2, which

belonged to this group, that almost all liver cells show the degenerative changes and are cut out of action to a very marked degree.

Type III.—Patchy necrosis of liver cells with or without cellular infiltration (figures 4 and 5). The necrosis is most marked in the central third of the hepatic lobules. Sometimes the necrosis is superimposed on the atrophic cells of the central portion of the lobule. The necrosis is usually patchy. Patches of cellular infiltration, when present, are made up of lymphocytes and fibrocytes chiefly.

Type IV.—Fibrotic changes (figures 6, 7 and 8). Fibrotic changes met with in cases 1, 6, 9 and 10 are all patchy. The fibrosis is usually present in the degenerated areas associated with necrosis. The series is too small to draw conclusions as to the relation of fibrosis to the number of attacks of congestive failure or their ætiology but it is evident that the fibrosis depends on the repeated episodes of cardiac failure with periods of partial and complete restoration of cardiac function.

The four types described above correspond with the three general groups of Boland and Willius (1938) and five groups of Lambert and Allison (1916). Absence of typical cardiac cirrhosis in the present series is due partly to small number of cases and partly to short duration of illness, with not more than four attacks of decompensation before admission. On account of lack of treatment facilities, the hospital class of patients do not survive the first few attacks of decompensation at the most and by then typical cardiac cirrhosis is not developed.

No definite correlation has been established between the histological findings and the values of hippuric acid excretion. The detailed study of the hippuric acid excretion in liver conditions in congestive heart failure will form the basis of another paper.

Summary.

Twelve cases of congestive heart failure have been described on whom the needle biopsy of the livers by Vim Silverman needle was done.

From the histopathological study of the biopsy tissue four types of hepatic changes have been described in congestive heart failure.

Type I.—Dilatation of sinusoids with cloudy swelling of liver cells and hæmorrhages.

Type II.—Liver cells showing extensive cloudy swelling of liver cells and fatty degeneration with or without much dilatation of sinusoids.

Type III.—Patchy necrosis of liver cells with or without cellular infiltration.

Type IV.—Patchy fibrosis.

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CLINICAL SIGNIFICANCE OF
HYPOPROTEINÆMIA

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MEASUREMENTS of plasma proteins were made in the beginning of the nineteenth century. Nevertheless, clinical observations were first stimulated by the work of Salvesen (1929) in Sweden. The significance of these important studies was overlooked for many years. It is only recently that the plasma proteins have achieved considerable clinical significance. Butt and co-workers (1939) have reported important studies on the subject. Myers and Muntwyler (1940) have written a brief summary of the few outstanding contributions which have found practical application in clinical work. Important contributions on the significance of the plasma proteins have been made by Peters (1942) and by Kagan (1943). The most recent discussion on the subject is by Muntwyler and Brooklyn (1945). This review will emphasize the clinical significance of hypoproteinæmia and will merely outline a few theoretical considerations dealing with the occurrence of hypoproteinæmia and its common clinical manifestations.

HYPOPROTEINÆMIA

Its occurrence and clinical manifestations

An abnormal lowering of plasma protein has a wide clinical significance and may occur as a result of (1) malnutrition, (2) excessive loss of nitrogen, (3) loss of plasma proteins, and (4) a defect in protein synthesis.

Malnutrition.—Hypoproteinæmia due to malnutrition is undoubtedly the one most prevalent in India and occurs in those who are unable to eat sufficient protein for economic reasons. It may also be present in those who are unable to assimilate food due to intrinsic gut changes. The albumin fraction is the one significantly involved in malnutrition. Weech (1938) and Elman and co-workers (1942) have shown

very clearly that the fall in plasma albumin begins promptly on withdrawal of protein from the diet. The longer the protein is withdrawn, the more is the hypoproteinæmia.

Excessive loss of nitrogen.—Loss of body weight may not indicate in a quantitative measure the degree of tissue protein loss because the changes in the water content are frequent and introduce a complicating factor. Loss of tissue protein is capable of clinical measurement by the amount of nitrogen excreted in the urine, in as much as all tissue protein, when broken down, results in a terminal excretion of nitrogen largely as urea and ammonia. Normally a few grammes of nitrogen are excreted in the urine each day due to metabolic wear and tear.

Excessive destruction of tissue protein occurs in wasting diseases and also in various infections as is revealed by the loss of nitrogen in the urine. Patients with severe cutaneous burns have also been found to excrete large amounts of nitrogen in the urine. Taylor and co-workers (1943) reported that, of 81 patients with burns, 40 had hypoproteinæmia. The degree of hypoproteinæmia seemed to have a definite correlation with the severity of burns.

Hypoproteinæmia in hyperthyroidism is due to excessive destruction of tissue protein as revealed by the increased loss of nitrogen in the urine.

Excessive loss of plasma protein.—Hypoproteinæmia occurs in renal conditions in which albuminuria is an important factor. Acute hæmorrhage is an excellent example of hypoproteinæmia produced by an extensive loss of plasma protein. Acute protein deficiencies are a feature of extensive burns following the exudation of serum in large traumatic areas. Blister fluid in burns is like plasma and may contain total protein varying from 3.7 to 4.3 g. per 100 c.c. Loss of protein is clearly an important and serious effect of severe cutaneous burns. It seems likely that many if not all the manifestations of severe burns are connected with this loss. The general manifestations of severe burns develop rapidly and if they are combated promptly many lives may be saved.

Defect in protein synthesis.—The intimate association of liver with the maintenance of normal level of plasma proteins is well known. Hypoproteinæmia has been found at one time or another in all patients who had chronic or advanced diseases of the liver. In cirrhosis of the liver with severe diffuse hepatic damage, hypoproteinæmia has been found to be more pronounced and results primarily from the inability of the liver to produce normal serum protein rather than to the external loss of protein in the ascitic fluid. There is a direct correlation between the level of serum albumin and the clinical course. Post and Patek (1942) reported the results of nitrogen balance studies which indicate that the patients with cirrhosis of the liver absorb and retain food protein. The evidence suggests that the mechanism of the synthesis of serum protein is impaired.

In accordance with the basic production mechanism of hypoproteinæmia Davis and Getzoff (1942) classified hypoproteinæmia into three types:—

1. Pre-hepatic hypoproteinæmia, in which there is interference with adequate intake, digestion or absorption of the plasma protein building material, but the ability of the liver to form plasma protein is not affected.

2. Hepatic hypoproteinæmia is primarily due to the inability of the liver itself to form plasma protein in spite of the fact that normal supplies of the protein building material are received from the intestine.

3. Post-hepatic hypoproteinæmia, in which there is adequate formation of plasma proteins by the liver, but an abnormal amount of plasma protein is lost as in severe burns, acute hæmorrhage or suppuration, etc.

CLINICAL MANIFESTATIONS OF HYPOPROTEINÆMIA

Œdema.—The association of hypoproteinæmia with œdema is well known. Nutritional œdema is probably one of the most important of the serious clinical manifestations of hypoproteinæmia. It is, however, important to realize that nutritional œdema is a late manifestation of hypoproteinæmia, for long before frank œdema appears, the adverse effect of hypoproteinæmia and incipient œdema are at work.

Barden, Radvin and Frazier (1937) showed by roentgen studies a marked delay in gastric emptying time in post-operative patients. The gastric emptying time varied inversely with the level of plasma proteins. The marked retardation of intestinal motility observed in dogs in which hypoproteinæmia has been produced has been attributed by Barden and co-workers to the œdema of the small intestine. Thompson, Radvin and Frank (1938) found that the delay in the intestinal motility was corrected following the restoration of the plasma proteins to normal level.

Ascites.—Although the accumulation of ascitic fluid in cirrhosis of the liver is largely due to portal obstruction, hypoalbuminæmia which is so frequent in these patients undoubtedly plays a part. On the other hand, it seems fairly certain that peripheral œdema, when it occurs in patients with cirrhosis, is determined largely by the protein deficiency. Elman and Lischer (1943) consider 'that the added and perhaps precipitating factor of increased portal pressure

explains why the accumulation of fluid in the peritoneal cavity is easier and more persistent than peripheral œdema'.

PLASMA PROTEINS IN NORMAL INDIVIDUALS

Literature contains several values of plasma proteins in normal individuals. These values are not wholly adequate since most of the studies have been made upon small groups of persons whose state of health in many cases is open to question. Besides, there is a great paucity of data with respect to plasma protein values in normal Indians.

This communication presents the summary of results of fractionation of plasma proteins in 70 healthy Indians by the sodium sulphate method of Howe (1921). All subjects with good health records were taken as normal.

Albumin.—The range of albumin was from 4.3 to 5.34, with a mean of 4.90 g. per 100 c.c. which is in good agreement with the mean of 5.06 g. reported by Gutman and co-workers (1941). The albumin values reported in the literature fall within a wider range from 3.66 to 5.7 g. per 100 c.c. In all probability, the concentration of albumin will not normally exceed 5.4 g., whilst values below 4.0 g. per 100 c.c. are definitely subnormal.

Total globulin.—The mean value of 2.59 g. per 100 c.c. for the total globulin is essentially the same as reported by Linder and co-workers (1924) and also by Salvesen (1926). Our mean is distinctly higher than the mean of 2.0 g. per 100 c.c. reported by Gutman. The spread of total globulin was from 2.15 to 2.93 g., with three-quarters of the values falling between 2.2 to 2.6 g. From the trend of our values in health and disease it would appear that all values above 2.8 g. per 100 c.c. are the result of disease process.

Euglobulin.—Only a small fraction of the total globulin is precipitated by 14.5 per cent sodium sulphate solution and is referred to as euglobulin. Our mean of 0.55 g. per 100 c.c. is higher than the mean of 0.39 g. reported by Stacey (1945), and distinctly higher than the mean of 0.2 g. reported by Gutman. In spite of the higher mean, most of the values fell well within the range of 0.18 to 0.6 g. per 100 c.c. reported by those workers.

Pseudoglobulin.—The range of pseudoglobulin was from 1.3 to 2.24 g. per 100 c.c., with a mean

TABLE I
Fractionation of plasma proteins in normal individuals

Average of	Total protein	Albumin	Globulin	Euglobulin	Pseudoglobulin	Fibrinogen
		g. per 100 c.c.				
45 males ..	7.51	4.93	2.58	0.52	1.82	0.25
25 females ..	7.49	4.87	2.60	0.56	1.74	0.26

of 1.79 g. which is in agreement with the mean of 1.8 g. reported by Gutman.

Fibrinogen.—The range of fibrinogen was from 0.12 to 0.48 g. per 100 c.c., with a mean of 0.25 g. which is the same as reported by Ham and Curtis (1938) in a review of plasma fibrinogen in normal persons.

Total protein.—The spread of total protein was from 7.0 to 7.95 g. per 100 c.c. This is in agreement with general experience.

PLASMA PROTEIN VALUES IN INDIVIDUALS APPARENTLY NORMAL

An alteration in the value of plasma protein may be encountered in individuals apparently normal. Both total protein and albumin below normal were found in persons apparently normal

out whether any departure from the normal could be associated with the presence of oedema of pregnancy toxæmias.

The total protein is low in pregnant women. Dieckmann (1941) reported that albumin alone suffers the fall, the globulin remains unchanged. According to him the low protein in pregnancy is due to dilution of blood. This appears incompatible since dilution will affect both the constituents. Our results indicate a definite increase in globulin during pregnancy. Total protein below 7 g., albumin below 4 g. and globulin above 3 g. per 100 c.c. were found in almost all the 40 cases of normal pregnancy. In toxic pregnancy the albumin is considerably lowered, the globulin showing little change from non-toxic group.

	Total protein	Albumin	Globulin	Eu-globulin	Pseudo-globulin	Fibrinogen
Average of 40 cases of normal pregnancy.	6.90	3.70	3.20	0.7-1	1.8-2.5	0.2-0.5

but under weight. It is likely that the protein reserves in these persons remain at a low level without any subjective or objective manifestations and is reflected in an accurate manner in a lowered range of plasma albumin.

Total globulin above normal (above 3 g. per 100 c.c.) was also found in persons susceptible to mild infections such as common cold, sore throat, etc., otherwise normal.

That an abnormality in the values of plasma proteins become apparent long before the disease is clinically perceptible is evident from the result of table II. All the subjects appeared normal when blood was collected for analysis.

PLASMA PROTEIN VALUES IN DISEASES PRESENTING HYPOPROTEINÆMIA

Hypoproteinaemia is undoubtedly due to a lowering of albumin, yet for the sake of study the cases can be classified under two heads :

1. Cases in which hypoproteinaemia is associated with a lowering of albumin, the globulin remaining unchanged.

2. Cases in which hypoproteinaemia is regularly associated with an increase in the value of globulin.

In the first group are included the diseases like anaemia, nutritional oedema, etc., in which chronic protein deficiency plays a part in the

TABLE II

Number	Total protein	Albumin	Globulin	Eu-	Pseudo-	Fibrinogen	REMARKS
				globulin			
				g. per 100 c.c.			
1	8.93	4.45	4.48	1.69	1.91	0.87	Attack of malaria 2 days later. Reported ill a month later. Clinically T.B. kidney. Had an attack of pyelitis.
2	7.26	4.07	3.19	1.07	1.72	0.42	
3	7.58	4.22	3.36	0.92	2.44	Serum	

It is proposed that individuals showing any of the manifestations such as loss of weight, loss of stamina or strength or a decreased resistance to infection should have the blood proteins examined for any possible state of protein deficiency or for the presence of mild or latent infection.

PLASMA PROTEIN VALUES IN PREGNANCY

Determinations of plasma proteins were carried out in the blood of pregnant women to ascertain the normal variations and also to find

production of hypoproteinaemia. In the second group one may include nephritis, tuberculosis, primary and secondary heart failures and also diseases of the liver such as cirrhosis, hepatitis, etc.

HYPOPROTEINÆMIA WITH NORMAL GLOBULIN

Anaemia.—Anaemia is one of the conditions to be anticipated when the protein supply of the body is reduced for one reason or another. The development of anaemia as a consequence of reduction of body protein is readily appreciated

when one considers that hæmoglobin within the cell is 95 per cent protein. 'For every gramme of iron in hæmoglobin there are some 800 grammes of protein'. If the diet is deficient in protein, it is possible that a part of the body protein has to be broken down to supply the necessary protein for the manufacture of hæmoglobin. This may result in a heavy drain on the total protein resources, during which plasma protein may be depleted.

The present report is a summary of the results of fractionation of plasma proteins on 82 cases of anæmia. Sixty-two suffered from uncomplicated anæmia. In the remaining 20 cases, anæmia was associated with certain complications, such as jaundice, ankylostomiasis, splenomegaly, etc. Fifty per cent of the cases had œdema at the time of admission to the hospital and ascites in some of the cases.

The spread of the total protein was from 7.5 to 3.75 g. per 100 c.c. The general distribution of the values was considerably below the normal range. The total protein was normal in 10 and varied from 6 to 7 g. in 26 others. A decrease in the total protein below 6 g. per 100 c.c. was observed in 46 of the 82 cases. The distribution of the values of globulin was in the lower range of normal in most of the cases.

By plotting the albumin values against total protein, a straight line was obtained as shown in figure 1, showing that a strict linear relationship exists between the total protein and

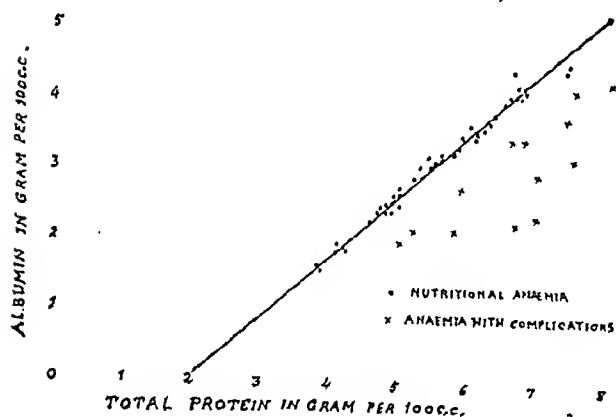


Fig 1

albumin. The equation of the straight line, determined by the customary method of least squares, was found to be as follows :—

$A = 0.886 \times \text{total protein} - 1.76$, where A is the gramme of albumin in gramme per 100 c.c. From this equation it is possible to calculate the value of albumin for a given value of total protein. Hence the value of globulin can also be accurately determined.

There is however no correlation between the total protein and albumin in those cases where certain complications were found to accompany anæmia. A glance at figure 1 is sufficient to demonstrate a sharp contrast between the two

groups. In the complicated group, the values of albumin are much below the regression line.

TABLE III
Observed and calculated values of albumin in nutritional anæmia

Total protein, g. per 100 c.c.	Albumin, g. per 100 c.c.		
	Observed value	Calculated value	Differences
7.12	4.54	4.55	+ 0.01
6.56	4.00	4.04	+ 0.05
6.00	3.54	3.55	+ 0.01
5.50	3.15	3.11	- 0.04
4.75	2.57	2.44	- 0.13
4.06	1.76	1.83	+ 0.07
3.75	1.53	1.56	+ 0.03

Nutritional œdema.—A characteristic œdema appears to be widespread during a war. The last war was no exception. Hypoproteinæmia was a constant finding in all cases of nutritional œdema.

In a study of 30 cases of nutritional œdema, the total protein was found to vary between 5 and 6 g. per 100 c.c. in 12 cases. Eighteen patients had total protein below 5 g. at the time of admission to the hospital. Albumin below 2.5 g. per 100 c.c. was present in 25 of the 30 cases. Fifteen patients had albumin below 2 g. per 100 c.c.

For the same value of total protein, the concentration of albumin in nutritional anæmia appears to be slightly higher than those observed in cases of nutritional œdema without marked anæmia. The correlation equation for the data of this group is therefore :—

$A = 0.762 \times \text{total protein} - 1.39$, where A is the g. of albumin per 100 c.c.

TABLE IV
Observed and calculated values of albumin in nutritional deficiency

Total protein, g. per 100 c.c.	Albumin, g. per 100 c.c.			œdema
	Observed value	Calculated value	Differences	
6.25	3.38	3.35	- 0.03	—
5.98	2.84	3.16	+ 0.32	—
5.48	2.86	2.78	- 0.08	—
5.12	2.62	2.51	- 0.11	+++
4.25	1.77	1.84	+ 0.07	+++++
4.16	1.70	1.77	+ 0.07	+++++
3.68	1.52	1.41	+ 0.11	+++++

Nutritional œdema is a later manifestation of hypoproteinæmia. According to Moore and Van Slyke (1930) œdema usually appears when the total protein falls below 5.5 g. and albumin below 2.5 g. per 100 c.c. The results of nitrogen balance studies indicate that a significant increase of plasma protein was difficult to demonstrate in

these patients following ingestion of high protein diet than simple maintenance of nitrogen equilibrium. A return of plasma protein to normal level followed by an increase in body weight was observed in 3 of our patients kept on high protein diet over considerable periods.

In their response to treatment with protein rich diet, the patients fall into two groups. In one there is fairly rapid and uncomplicated recovery; in the others the progress is slow and laborious. Some of the patients die suddenly and unexpectedly. This group of patients requires further study.

HYPOPROTEINÆMIA ASSOCIATED WITH INCREASED GLOBULIN

Sub-acute nephritis.—The occurrence of hypoproteinaemia in sub-acute nephritis is well known. Hypoproteinaemia in this group is usually associated with increased globulin. The range of globulin was from 3 to 4 g. per 100 c.c. Total protein below 5 g. and albumin below 2 g. per 100 c.c. was found in most of our patients. The low albumin is undoubtedly responsible for the oedema in these patients. When the patients were free from oedema, they still remained abnormal as was evidenced from the reduced albumin which persisted in some of our patients followed for more than 2 years. The loss of nitrogen in the urine does not account for such a low level of albumin so common in this condition. The albumin values can be predicted from the values of total protein by the application of the equation:—

$A = 0.384 \times \text{total protein} - 0.19$, where A is albumin in g. per 100 c.c. The calculated values agree fairly accurately with the observed values as shown in table V.

Acute nephritis.—The values of plasma protein in acute nephritis is significantly different from

TABLE V

Observed and calculated values of albumin in acute and sub-acute nephritis

Total protein	Albumin		Total protein	Albumin	
	Observed	Calculated		Observed	Calculated
g. per 100 c.c.			g. per 100 c.c.		
<i>Acute nephritis</i>			<i>Sub-acute nephritis</i>		
9.97	5.34	5.75	5.06	1.57	1.75
8.81	5.25	4.93	4.94	1.72	1.70
7.37	4.16	3.90	4.81	1.93	1.65
6.89	3.45	3.53	4.44	1.44	1.51
6.06	3.09	2.94	4.21	1.47	1.42
5.90	2.95	2.83	3.30	1.07	1.07

those observed in sub-acute nephritis. Hyperglobulinaemia present in 80 per cent of the cases was due to associated infection. The range of globulin was from 3 to 4.9 g. per 100 c.c. Total

globulin above 5 g. was present in 4 of the 44 cases. The spread of total protein was from 5.43 to 9.97 g. per 100 c.c. The concentration of albumin above 3 g. per 100 c.c. was present in 34 of the 44 cases. The oedema of acute nephritis is not referable to low albumin as is evidenced by the higher level of albumin in these patients.

The albumin values can be predicted from the value of total protein with sufficient accuracy for clinical purpose from the equation:—

$A = 0.726 \times \text{total protein} - 1.47$, where A is the albumin value in g. per 100 c.c.

Hypoproteinaemia in cardiac diseases.—Alterations in the value of plasma proteins in cardiac disease consist in a decrease in albumin associated with an increase in globulin in 75 per cent of the cases. Albumin above 3 g. per 100 c.c. was present in 90 per cent of the cases. The total globulin showed a wide range of variation—from 1.87 to 5.27 g. per 100 c.c. The extent of globulin increase determined whether total protein was normal or below normal. There is no correlation between the total protein and the albumin.

Thomson (1934) suggested that plasma protein deficiency plays an important part in the aetiology of cardiac oedema. Observations on patients with and without oedema do not justify the conclusion that deficiency of protein is a contributory factor in the causation of cardiac oedema. Oedema in cardiac cases appears at a higher level of plasma proteins as is shown by the following cases:—

TABLE VI

Plasma protein in cardiac oedema

Total protein	Albumin	Globulin	REMARKS
g. per 100 c.c.			
7.63	4.71	2.97	Breathlessness and oedema of the feet.
7.43	3.81	3.62	Cardiac failure; oedema.
7.25	3.63	3.62	Ascites and cardiac failure.
7.18	2.99	4.19	Swelling of both legs and cardiac failure.
6.37	3.37	3.50	Breathlessness; swelling of both legs.
6.50	3.00	3.50	Oedema of limbs, fluid in abdomen.

Hypoproteinaemia in cirrhosis of the liver.—Determination of plasma protein during the course of cirrhosis and other type of liver diseases have been made by several investigators. Myers and Keefer (1935) and Tumen and Bockus (1937) reported that hypoalbuminaemia was the most constant alteration of serum protein in all their patients who had chronic or advanced diseases of the liver. The elevation of serum globulin was not as significant as the reduction in serum albumin. Post and Patek (1942)

reported that a reduction of serum albumin is an essential factor in the production of ascites. Recently various authors have demonstrated a rise in serum globulin in some type of hepatic disease, especially cirrhosis.

The result of fractionation of plasma protein in 60 cases of cirrhosis of the liver showed that albumin below 3 g. and varying between 1.4 and 2.49 g. per 100 c.c. was present in 42 of the 60 cases. Our figures with regard to the low albumin in cirrhosis play only a confirmatory rôle. The increase in the concentration of globulin was as constant in this series as the lowering of albumin. The range of total globulin was much wider—from 3 to 8.31 g. per 100 c.c. The values of total protein varied according to the rise in globulin in the range of 5.65 to 19.87 g. per 100 c.c. In spite of low albumin, hypoproteinæmia was present only in 26 of the 60 cases studied.

In contrast to the foregoing data are those of 13 patients who were less severely ill. They were admitted for irregular fever and distension of abdomen and jaundice in some of the cases. Nevertheless, all of them revealed signs of cirrhosis of liver. The values for albumin and globulin varied between 3 and 4 g. in each of these patients. The total protein ranged from 6.56 to 7.62 g. per 100 c.c. The results of fractionation of plasma proteins of these patients are shown in table VI, group B.

TABLE VI

Fractionation of plasma protein in cirrhosis of liver

Total protein	Albumin	Globulin	Euglobulin	Pseudo-globulin	Fibrinogen
g. per 100 c.c.					
<i>Group A—Albumin below 3 g.; globulin varying from 3 to 8.31 g.</i>					
10.81	2.56	8.31	5.16	2.98	0.17
9.61	2.55	7.06	4.89	2.00	0.17
8.70	2.57	6.13	2.88	2.98	0.27
7.81	2.32	5.52	3.12	2.12	0.23
7.37	2.94	4.43	1.41	2.76	0.26
6.43	2.27	4.17	1.25	2.41	0.50
6.00	2.44	3.56	1.57	1.90	0.29
<i>Group B—Both albumin and globulin varied between 3 to 4 g.</i>					
6.56	3.13	3.43	1.63	1.50	0.30
6.93	3.81	3.12	0.68	2.22	0.22
7.12	3.52	3.60	1.22	2.17	0.21
7.62	3.56	4.06	1.38	2.33	0.35

The results of table VI indicate the general trend of values of plasma proteins in cirrhosis of the liver. From these results it is evident that there is no correlation between the total protein and the albumin, since globulin vary so widely. The increase in the value of globulin was almost entirely due to an increase in the

value of euglobulin, the pseudoglobulin showing a less marked but statistically significant increase. The values of total protein were related to the rise in globulin.

A study of these results does not justify any definite conclusion as to what relation the changes in the plasma protein bear to the course of the disease. From the trend of the values it would appear that the albumin tends to decrease as the disease process continues until it reaches a low level in advanced cases. We can give no reason for such a wide variation in the value of globulin. It is, however, likely that malnutrition is responsible for the low albumin in many of the patients without a marked rise in globulin. The increase in the value of euglobulin in all cases of cirrhosis is significant. Our results are in perfect agreement with the suggestion made by Stacey (1945) that euglobulin/albumin ratio may provide more sensitive indices of disordered protein formation in cirrhosis of liver. It is expected that nitrogen balance studies with high protein diet may throw more light on this point.

Conclusion

Determination of plasma proteins is of considerable clinical significance. The importance of plasma protein estimations for clinical purposes lies in the fact that unlike tissue protein they are capable of clinical measurement. Many methods have been employed for the determination of plasma proteins. Doubtless, many discrepancies in the literature are explained by the variations in the method used. The Kjeldahl procedure when carried out accurately is preferable to others in that it leads to fewer discrepancies and the results obtained are highly reproducible.

An accurate estimation of the different components of the plasma proteins is too laborious and time-consuming. From a clinician's point of view it is important to know whether the value of total protein alone is sufficient, if so, in what conditions. It is also important to know the types of cases in which an accurate knowledge of albumin and globulin is informative.

A normal value of plasma protein may be obtained even though the albumin fraction is markedly depleted. This is due to the fact that a diminution of albumin may co-exist with a corresponding increase in the globulin fraction, so that the fall in the albumin fraction is masked unless fractionation is carried out. It is for this group of patients that there is the greatest need for an accurate estimation of the values of albumin and globulin.

The usual practice of expressing the plasma protein values in terms of albumin-globulin ratio without reference to the total protein is of limited value, unless globulin remains unchanged. Interpretation of the results of plasma protein determinations from a clinical point of view is based largely upon the concentration of each

separate fraction with its independent functions and not upon the ratio of the two components.

A large number of patients are now being admitted to the hospital who have general (subcutaneous serous cavity) œdema without evidence of the usual forms of pathology which produce such waterlogging. They do not exhibit any of the clinical symptoms of renal or cardiac involvement or of liver disease. Many of these patients have excessive degree of hypoproteinaemia. The intensity of hypoproteinaemia can be ascertained from the value of total protein. The albumin values can be predicted from the value of total protein by the application of the equation $A = 0.762 \times \text{total protein} - 1.39$.

Dietary deficiency is known to cause macrocytic or nutritional anaemia. The fact that anaemia is present indicates that the preceding nutritional disturbance has existed for a fairly long time. In advanced cases, as much as 20 to 25 per cent of globulin protein may be lost resulting in hypoproteinaemia. The albumin fraction of the plasma protein seems to be the necessary replacement item. An accurate estimate of the albumin fraction may be obtained from the value of total protein by the application of the equation $A = 0.886 \times \text{total protein} - 1.76$, provided other complications do not accompany anaemia.

Protein deficiency occurs in renal conditions in which albuminuria is an important factor. Hypoproteinaemia in these patients is associated with an increase in the value of globulin due to associated infection. The values of albumin can, however, be predicted from the values of total protein by the application of the correlation equation mentioned in the text.

An accurate estimate of the values of albumin and globulin is essential in all patients with elicitable manifestations pointing to tuberculosis, cardiac disease, cirrhosis, myxoedema or a malignant growth and also in all other cases where the clinician suspects that simultaneous occurrence of two different conditions one leading to lowering of albumin and the other to an increase in globulin.

The euglobulin is considerably increased in all patients with cirrhosis of the liver. The increase in euglobulin appears to take place at the expense of the albumin fraction of the plasma proteins. In the hypoproteinaemia accompanying the cirrhosis with ascites, the determinations of euglobulin are valuable as corroborating proofs of the liver cell damage when clinical symptoms definitely point to the liver as the essential seat of the disease. In the investigation of cases of ascites due to chronic malnutrition, the estimation of euglobulin may be also valuable to the clinicians in differentiating cases of purely nutritional deficiency from those where latent liver disease is suspected.

In clinical practice, a single determination of plasma proteins may not prove to be of much value. Repeated determinations often provide valuable information concerning the state of the patient because they reveal the course of

the disease through deterioration or improvement.

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CHOLINE DIHYDROGEN CITRATE IN INFANTILE BILIARY CIRRHOSIS

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INFANTILE biliary cirrhosis has been accepted as a separate clinical entity for nearly a decade now. The toll of infants taken by this disease in various parts of India should justify a record and classification of deaths due to this disease under a separate head. But the public health authorities throughout India have not been impressed to the extent desirable to make them understand the necessity for such a record.

The result of this position is that an investigator who wants to investigate the aetiology of this disease lacks the preliminary statistics of its incidence and death rate. Each investigator is left to his own resources and capacity to get the necessary data and do the investigations. Work by me in this direction was published in five articles in the *Indian Medical Journal* (*I.M.J.*, Vol. 33, No. 11, November 1939; *I.M.J.*, Vol. 34, No. 2, February 1940; *I.M.J.*, Vol. 34, No. 3, March 1940; *I.M.J.*, Vol. 34, No. 5, May 1940; *I.M.J.*, Vol. 35, No. 12, December 1941). The sum and substance of those articles is that :—

1. The disease is fairly widespread.
2. The incidence is greater in some parts of Madras Presidency, the Central Provinces, the southern portion of Bengal and Bombay Presidency.
3. The male sex shows a greater proclivity to the disease.
4. The children suffering from it are those fed on rich and fatty diet.
5. The habitual administration of castor oil is likely to be responsible in some cases on account of its being a thick fatty oil capable of damaging the liver cells.
6. The children suffering from this disease are predisposed particularly on account of hyperactivity of some of the endocrine glands.

Though these points give us an idea of the predisposing causes of the disease the exciting cause has not been found to be definite. Bacteriological investigations made repeatedly by various observers have brought forth nothing except that in some cases *B. coli* have been found to grow in the cultures of urine of patients suffering from the disease. But the theory of the organisms being responsible for the causation of cirrhosis, etc., is not acceptable to many. In the absence of specific extraneous causes endogenous toxins and non-specific proteins have been thought of. But these again do not account for all the cases. The conclusion, therefore, is that in children predisposed to this disease cirrhosis is easily brought about by any one or a combination of a number of cases.

The pathological findings in the structure of the liver in this disease have been as follows :

1. Varying degrees of necrosis of the liver cells uniformly distributed throughout the organ.
2. An avascular non-inflammatory oedematous connective tissue network enclosing in its meshes small islands of hepatic parenchyma of unequal sizes and in varying degrees of degeneration.
3. An obliterative lesion of the terminal and some of the bigger divisions of the hepatic venous tree without appreciable changes in the portal venous and biliary trees.
4. Areas showing disorganization of the reticulum of the sinusoidal capillary bed mostly around the hepatic venous terminals.

5. An unsuccessful attempt at regeneration of the hepatic parenchyma as evidenced by the small size of the rounded lobules of the liver cells distributed throughout the organ.

The treatment has naturally to remove the cause. Most of the preventable causes can be tackled but the cirrhosis itself has been found to be difficult to counteract.

For diminishing the tendency of the liver to produce the enormous amount of fibrous tissue at the expense of the liver cells, in the absence of any suitable drug, various methods of empirical treatment in the form of administration of vitamins, calcium, iron and such other things have been tried with little or no effect. A few cases which are on the border line of health and disease get well but in typical cases of cirrhosis this sort of empirical treatment is of no avail.

This fact of a lack of a suitable drug to treat the disease made me turn to other countries to find out how they were dealing with cases of this type. A searching enquiry both into the literature and the incidence of this disease in countries like America has shown that though cirrhosis of the adult variety is fairly common, the clinical entity as observed by us in cases of infantile biliary cirrhosis in India is not found there. Nevertheless I thought it would be to our advantage if we can know whether the clinicians there were able to treat successfully at least cases of cirrhosis of the adult type. With this aspect in view, I contacted Eli Lilly and Company who were kind enough to send me samples of choline dihydrogen citrate tablets which were found to be useful in cases of cirrhosis of adults.

I have been administering this drug to all children suspected to be suffering from this disease. Altogether 102 cases were tried. 75 of these were children under 2 years, 16 of them between 2 and 3 years and 11 under 1 year. 62 of them were early cases with only slight enlargement of the liver, and palpable spleen, slight anaemia, phosphates in urine, irritable temper and a slight diminution of weight. All these cases recovered within two weeks of the administration of the drug. Three to four tablets a day were given. Injections of liver extract with vitamin B were given in older children. Liver began to diminish in size. Children began to put on weight. Activity became normal and irritability gave place to cheerfulness. Rice diet has been found to be agreeable to most of the children except a few young ones who were on milk diet. Excess of fat was avoided in all these cases.

13 cases came after ascites had set in; 4 of these only recovered, in whom there was just a small quantity of fluid. The other cases in which ascites was marked ended fatally.

17 cases came with other intercurrent ailments, complicating the cirrhosis. All these cases recovered. In most of the cases ascariasis

infection was present. Malaria, kala-azar, etc., were also noted in some cases.

Three cases came in an advanced state of the disease and all of them ended fatally in spite of treatment.

Thus it will be seen that in a total of 102 cases carefully selected for treatment with choline dihydrogen citrate 79 recovered, though some of them are still taking the drug. It may also be noticed that the drug is of great value in early cases where the damage to the liver cells has not been much and where recovery is easy and possible without much difficulty.

The ease with which the drug can be administered and the absence of ill-effects are the special advantages of the drug. The only trouble met with is occasional diarrhoea. The drug is then stopped. It can be again administered as soon as the intestinal irritability subsides.

OBSERVATIONS ON AN OUTBREAK OF KALA-AZAR IN CALCUTTA

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ABOUT a quarter of a century ago, Knowles, Napier and Das Gupta (1923) showed that kala-azar was prevalent in an endemic form in certain areas of Calcutta, inhabited mainly by poorer classes of Anglo-Indians, Indian Christians and Mohammedans. In spite of the fact that large numbers of imported cases resided in other areas of the town very few or no cases of kala-azar occurred amongst the permanent residents of these apparently non-endemic areas. They concluded that the conditions requisite for the transmission of kala-azar from one patient to another were at their best (or worst) as far as Calcutta was concerned in that endemic area of the city. It is interesting to recall that the investigations and experiments carried out mainly by the workers of the School of Tropical Medicine, Calcutta, the Kala-azar Commission of India and other kala-azar research units of the Indian Research Fund Association that followed this observation during the next two decades led first to the incrimination of the sand-fly, *Phlebotomus argentipes*, as the vector of kala-azar, and finally the solution of the kala-azar transmission problem, when Swaminath, Shortt and Anderson (1942) succeeded in transmitting the disease to human volunteers by the bite of the sand-fly.

The data that formed the basis of this pioneer epidemiological investigation were collected by Napier at the kala-azar clinic of the Calcutta School of Tropical Medicine. This clinic was opened at the beginning of 1921 and during the first year the attendance increased month by month and a steady level was reached in a year or two. This was the first out-patients' clinic for

kala-azar in Calcutta at the time of its inception. Though other out-patients' clinics were started in the city during the next few years, the attendance of the patients at this clinic has been quite considerable on account of its popularity and suspected cases of kala-azar from different parts of the city as well as those imported from different parts of Bengal and the neighbouring provinces attend for diagnosis and treatment. The clinical and epidemiological data relating to the indigenous kala-azar cases may thus properly be regarded as pertaining to a representative statistical sample of the kala-azar cases in the city.

During the years following the Bengal famine of 1943, it was found that steadily increasing numbers of cases of kala-azar and those with grave complications were being encountered at the kala-azar clinic of the School of Tropical Medicine, Calcutta. A study of the epidemiological and clinical data collected during the routine investigation of the patients attending the clinic or admitted into the Carmichael Hospital for Tropical Diseases was undertaken. In this paper it is proposed to present the results of this study under three principal headings, (a) the trends of incidence of kala-azar in Calcutta, (b) the distribution of the disease in Calcutta, and (c) the variation in the clinical picture of kala-azar seen during the period following the famine and then to discuss these findings and consider the epidemiological factors concerned with the outbreak of kala-azar in Calcutta.

The trends of incidence of kala-azar in Calcutta

As indicated previously the figures relating to the indigenous kala-azar cases attending the clinic at the School of Tropical Medicine, that form a representative sample of the kala-azar affected population of Calcutta, have been utilized for the study of the trends of incidence of the disease in the city. It has been found out that about half of the total number of kala-azar cases attending the clinic are indigenous cases (see table I and chart 1). From these two, i.e. the chart 1 and the table I, the trends of incidence are readily ascertained.

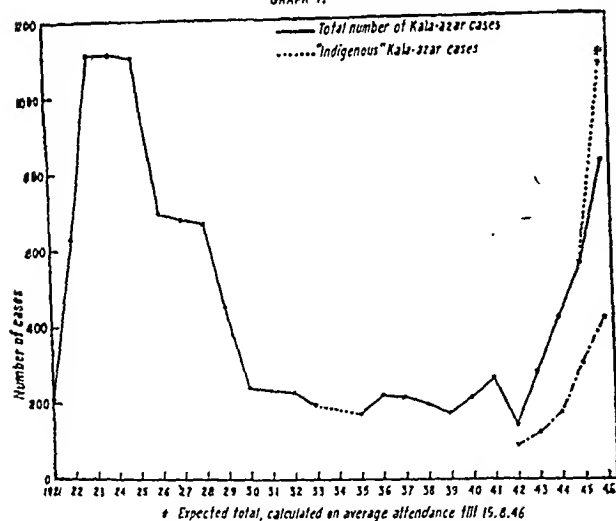
It will be seen that there was a peak of incidence in the year 1923 and the number of cases remained practically steady for the next two years, and then gradually the number of cases decreased till a more or less steady inter-epidemic level was reached and maintained from 1930 to 1943. The low figure in 1942 was due to partial evacuation of the population on account of the war scare. The next wave of increased incidence commenced with a rise in the number of cases in 1944; by 1945 the rise was well marked and in 1946 a high peak was reached. This rise of the number of cases of kala-azar is even more strikingly shown by the chart showing the number of new cases of kala-azar per month since 1943 (see chart 2). The rise was gradual but steady from 1944 till

TABLE I

Years	Total number of kala-azar cases	Indigenous kala-azar cases
1921	207	..
1922	631	..
1923	1,117	..
1924	1,118	..
1925	1,108	..
1926	696	..
1927	682	..
1928	670	..
1929	450	..
1930	236	..
1931	234	..
1932	228	..
1933	190	..
1934	No record	..
1935	164	..
1936	215	..
1937	213	..
1938	195	..
1939	170	..
1940	211	..
1941	260	..
1942	132	85
1943	267	117
1944	413	173
1945	554	302
1946	817	416
	1,068*	511*

* Total expected on average attendance till 15th August, 1946.

GRAPH I.



February 1946, and since then there was a steep rise that reached the peak in July to August 1946. From the 16th August, 1946, the number of cases dropped suddenly on account of the grave disturbances that commenced in the city on that date and most of the patients were unable to attend for treatment. Since that date the attendance was very variable on account of the persistence of the disturbances and figures relating to the attendance of the patients after this date are thus not of any value statistically.

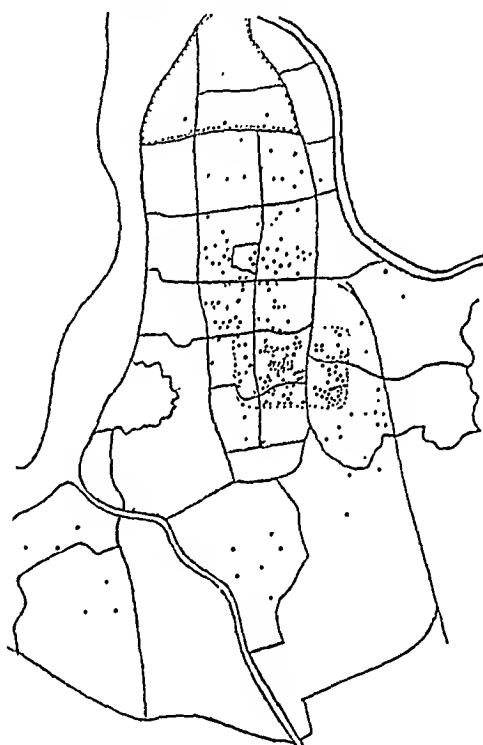
The distribution of kala-azar in Calcutta

Three spot maps of Calcutta (maps 1, 2 and 3) are given below. These show the distribution of the indigenous cases of kala-azar in the city. The map 1 is from Knowles *et al.* (1923) and is included in order to show the distribution in 1922-23. In this and the other maps only those cases of kala-azar have been included as 'indigenous' that were in patients who had lived all along in Calcutta since their birth and those who had been staying in the city for at least 2 years before the onset of the symptoms of kala-azar.

On examination of these maps 1 and 2 it will be found that during 1942-43 the distribution of kala-azar in Calcutta was very similar to that described in 1922-23 by Knowles

Map 1.

Indigenous kala-azar cases.



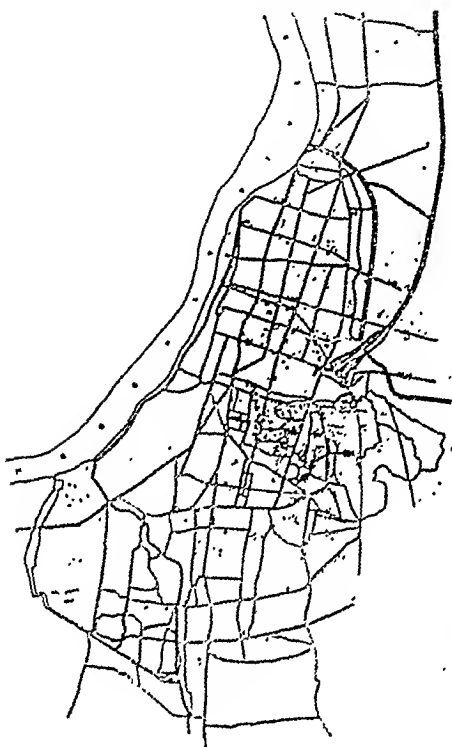
and his colleagues. The wards described by them as the endemic area of kala-azar were as badly affected as previously. Comparison of the maps 2 and 3 shows that in 1945 and 1946, apart from the fact that there was a large number of cases from the kala-azar endemic area, increasing numbers of cases were seen from other areas of Calcutta particularly from those in the north-eastern and south-western fringe of the town.

The other fact elicited was that in a large proportion of cases the patients came from the bustees of Calcutta. From certain bustees a fair number of cases were encountered every year. Inside the city these bustees can truly be regarded as the home of kala-azar. The other type of kala-azar houses were the old-time buildings, not in good repair, and the servants' quarters and the out-houses and the dwellings of the well-to-do people.

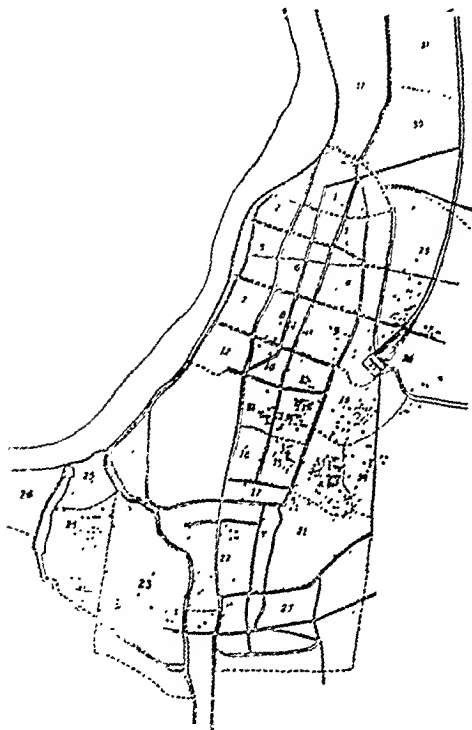
Also an analysis of the records of the indigenous cases showed that in 1946, 209 were in Moslems, 160 in Hindus, 19 Indian Christians,

Map 2.

Kala-azar in Calcutta (indigenous cases).



Map 3.



and 27 Anglo-Indians and one Chinese; of the imported cases the corresponding figures were 139, 250, 6, 4 and 2.

Variations in the clinical features of kala-azar, during the outbreak

It is well known that in India the highest incidence of kala-azar is among the children between the ages of 5 and 15 years. During the period following the famine it was found that quite a large number of adult patients were suffering from kala-azar. The following table gives the age incidence of kala-azar cases seen at the kala-azar clinic during 1946 and that given by Napier (1943) as typical for Asian endemic areas generally. Napier's figures were collected from a rural area near Calcutta.

The table shows that the age groups 5 to 10, 10 to 15, 15 to 20 and 20 to 30 were more or less equally affected by kala-azar in 1946, and even in the age group 30 to 40 the proportion of cases was higher in 1946 than the figures in Napier's table of age incidence. It may be concluded that in 1946, the children and adults were more or less equally affected and even older people were not spared.

The history about the onset and the progress of illness is unreliable in many of the patients attending the kala-azar out-patients' clinic; so it is not proposed to discuss the presence of variations in the course of kala-azar on the data collected at the out-patients' clinic. But the general impression gained was that the patients appeared to be more seriously ill than in the previous years, and the serious complications were more frequent. An analysis of the case notes of the kala-azar patients admitted into the Carmichael Hospital for Tropical Diseases during 1935 to 1939 and 1943 to 1946 is presented below in order to show the occurrence of the serious complications of kala-azar during these periods, the former being an inter-epidemic period and the latter that of an outbreak of kala-azar (see table III).

This table shows that the grave complications were much more frequent both as regards the types of complications and their relative incidence during the period 1943 to 1946 and more so during 1945 and 1946 than during 1935 to 1939. For example, during 1935 to 1939, 233 cases were admitted into the hospital; of these only 4 had cancerum oris (1.7 per cent); and during 1943 to 1946, 420 cases were admitted, of which 30 (7.1 per cent) had this complication. Respiratory and gastro-intestinal complications, generalized oedema, hæmorrhages, jaundice, severe anæmia, pneumococcal meningitis, etc., were not infrequently seen. Agranulocytosis as a grave complication of kala-azar, the first case being reported from India only in 1942, was encountered in no less than 3 cases in 1946 and two more cases were seen during the first six months of 1947.

Discussion

The marked increase of kala-azar, as shown by the graphs and tables above, indicate that there was an outbreak of kala-azar affecting a large number of people, i.e. there was an epidemic of

TABLE II
Age incidence

Age groups	1946		NAPIER (1943)	
	Number of cases	Per cent	Number of cases	Per cent
Under 5 years	26	6.2	48	12.4
5 years but under 10 years	81	19.4	105	27.13
10 " " " 15 " " "	87	20.9	89	23.00
15 " " " 20 " " "	72	17.3	46	11.88
20 " " " 30 " " "	80	9.6 × 2	67	8.65 × 2
30 " " " 40 " " "	48	5.75 × 2	24	3.1 × 2
40 " " and over	22*	2.64 × 2	8	1.03 × 2
	416		387	

* 40 to 50 years 16 cases and over 50 years 6 cases.

TABLE III
Complications of kala-azar

Years	1935	1936	1937	1938	1939	1943	1944	1945	1946
Total number of cases admitted ..	56	49	52	39	37	50	56	126	188
Complications .. .. .	..	..	2	..	..	6	4	9	11
Cancrum oris	2	..	2	1	1	1	..	8	4
Pneumonias	2	6	2	1	1	..	3	5	3
Dysentery .. .. .	..	..	1	..	1	..	2*	2	1
Hæmorrhages .. .. .	..	..	1	..	1	..	..	1	2
Meningitis .. .. .	..	..	1	..	..	..	..	..	..
Cirrhosis of liver ascites	2	..	..	1	..	2	2	..	..
Kala-azar and pulmonary tuberculosis ..	..	..	1	..	..	2	2	..	6
Severe bronchitis .. .. .	..	..	..	..	..	1	..	1	2
Jaundice .. .. .	..	..	..	..	..	1	..	1	..
Jaundice and hæmorrhages .. .. .	..	..	..	..	..	..	..	1	2
Grave anæmia .. .. .	..	..	..	..	..	..	..	2	1†
Grave anæmia, anasarca and æsthenia ..	..	..	..	..	..	..	..	1	2
Pleural effusion .. .. .	..	..	..	..	..	..	..	1	..
Cardiac failure .. .. .	..	..	..	..	..	..	1	..	2
Severe enteritis .. .. .	..	..	..	..	..	..	..	..	3
Agranulocytosis .. .. .	..	..	..	..	..	..	..	..	..

* One case had hæmorrhage from the respiratory tract; ? cancrum affecting the larynx.

† One patient had dysentery and intestinal hæmorrhage as well and another developed pneumococcal meningitis.

‡ This patient had splenic infarction and dysentery as well.

kala-azar in Calcutta; the peak of the epidemic was apparently reached about the middle of 1946. (The data collected after the 16th August, 1946, was not representative on account of the persistent disturbances in the city). The increase of kala-azar was up to about four times the level during the inter-epidemic period 1930 to 1943.

It is now proposed to consider the general factors affecting the population of Calcutta that formed the background of and probably led to this outbreak of kala-azar.

According to Napier (1943), a concatenation of climatic or other factors, such as widespread distress after an earthquake or an influenza epidemic, determines a general increase and that local conditions and population factor determine the extent and duration of the outbreak; when all the susceptible material, *i.e.* the children born

since the last epidemic wave, is exhausted, the disease dies down.

The epidemiological factors that are now being considered are discussed under the following headings: (a) climatic factors; (b) the effect on the population of general economic distress, famine and war-time conditions; (c) outbreaks of other diseases, particularly malaria just preceding the outbreak of kala-azar; (d) the population factor, *i.e.* the presence of highly susceptible material in the population particularly in the form of children born since the last epidemic wave; and (e) the question of increase of virulence of the parasite, *Leishmania donovani*.

In order to find out if there was any difference in the climatic conditions during an epidemic period, the average maximum and minimum temperature, humidity and rainfall during the periods 1921 to 1925, and 1943 to 1946 and the

inter-epidemic period 1935 to 1939 were studied in detail. No marked difference was apparent or any particular type of departure from the conditions during an inter-epidemic period seen during the epidemic periods. The chart shows the average maximum and minimum temperatures, humidity and total rainfall per month during the three periods and it will illustrate the above findings.

The other fact that appears interesting is that during the months of July, August and September and possibly parts of June and October as well, the climatic conditions are at an optimum level in Calcutta for the development of the leishmania in the sand-fly. It is known that the leishmania grow best in the sand-fly at about 28°C., i.e. about 82.4°F., in the presence of high humidity of over 80 per cent (Smith, *et al.*, 1940; Swaminath *et al.*, 1942). The mean temperature during these months is about 84°F. and the fluctuation above and below the mean about 5°F., and the humidity is above 85 per cent.* It may be mentioned that during these months sand-flies are found in relatively large numbers in the endemic areas of Calcutta (Napier and Smith, 1926).

The effect on the population of general economic distress, famine and war-time conditions

The year 1943 saw serious economic distress and food scarcity followed by a grave famine that affected the whole of Bengal and led to the death of 1.5 to 3.5 million people according to different estimates. The worst period of the famine was during the months of August, September, October and November 1943 and even for months afterwards considerable economic distress persisted. During this period except for the distress caused by the relative scarcity of food, the indigenous population of Calcutta did not undergo the ordeal of the famine to the same extent as the rural population of Bengal. But the population of Calcutta was brought into close contact with the famine-stricken 'destitutes' from the districts of Bengal who came into Calcutta during the famine. Apart from the insanitary conditions that were inevitably associated with this influx of destitutes who died by thousands on the streets and in improvised shelters and relief hospitals of Calcutta from the effects of starvation and the various diseases (for fuller details, see Fitch, 1947), the other factors that came into operation on the population of Calcutta were (a) the introduction of newer strains of disease-producing organisms and (b) overcrowding, particularly in the poorer class localities and the outskirts of the town where destitute camps were located. It is generally believed that the epidemic of malaria of 1943-44 was to a great extent due to the introduction of

new and virulent strains of the parasite by the famine-affected rural population.

During 1942 and the years following Calcutta was a military base, and apart from the influx of the armed forces from the different parts of the world, there was frequent movement of the military personnel and labourers, considerable proportion of which was from non-kala-azar areas and thus quite non-immune to this disease, between Calcutta and the forward areas in Assam and East Bengal which are bad kala-azar areas. Also large numbers of factories were started in and around the city for the supply of war materials and this led to an influx of the rural population into the city in search of employment. The immediate effect of this was overcrowding of the *bustees* to a marked extent (and of the better class residential quarters to a less extent) and the introduction of disease-carrying population into these areas. (From chart 1 and table I it will be seen that there was an increase of both *imported* and indigenous cases of kala-azar during this outbreak.) Sanitation, never satisfactory in the *bustees* and quarters of the poorer classes, was rendered much worse on account of the overcrowding and the conservancy rendered insufficient by war-time conditions and other disturbing factors.

The effects of these factors, *viz* general economic distress, famine and war-time conditions, were chiefly the lowering of resistance to diseases due to under-nourishment, overcrowding in the *bustees* and the dwellings of the poorer classes of the population mainly and the presence of imported and indigenous disease-carrying population in these areas, thus increasing the chances of kala-azar affected and non-infected people living in close proximity and amidst insanitary surroundings rendered worse by war-time conditions and overcrowding. This last-named factor, *viz* insanitary surroundings, really meant accumulation of garbage, excreta of animals in and around the *bustees* and the dwellings of the poor that had fallen into disrepair, thus providing excellent breeding grounds and shelters for the sand-fly, *Phlebotomus argentipes*, the vector of kala-azar in India.

Outbreaks of other diseases, particularly malaria, previous to the epidemic of kala-azar

The famine of 1943 brought in its wake the outbreaks of several diseases in Calcutta. The principal diseases were cholera (1943), small-pox (1944), enteric fevers and malaria (1943-44). That attacks of these diseases can lower the body resistance of the population already devitalized by food scarcity is quite probable, but the importance if any of the above diseases in leading to the outbreak of kala-azar has to be examined in some detail.

Cholera.—The outbreak of cholera began in October 1943 and the worst affected areas were the wards 27, 22, 28, 29 and 9 in 1943 and the

*The mean temperature is probably lower and the daily variations much less, probably not more than 1°F. in the natural shelters of the sand-fly during this period (Napier, 1927).

wards 18, 23, 26 and 32 in 1944. Except for the wards 28, 29 and 18 which were affected by other diseases as well, there was little or no kala-azar in the remaining wards affected by cholera. There was no serious outbreak of cholera in the kala-azar endemic area of Calcutta.

Small-pox.—This disease has little relation with the outbreaks of kala-azar. In Calcutta usually there are epidemics of small-pox every fourth or fifth year and there are frequently two outbreaks, a milder outbreak during a pre-epidemic year followed by a severe epidemic year. These outbreaks have no time relation with kala-azar. The wards 29 and 27 were the worst affected areas in 1943 and from the former ward many cases of kala-azar were seen in 1945-46; this area was however affected by other diseases as well in 1943-44.

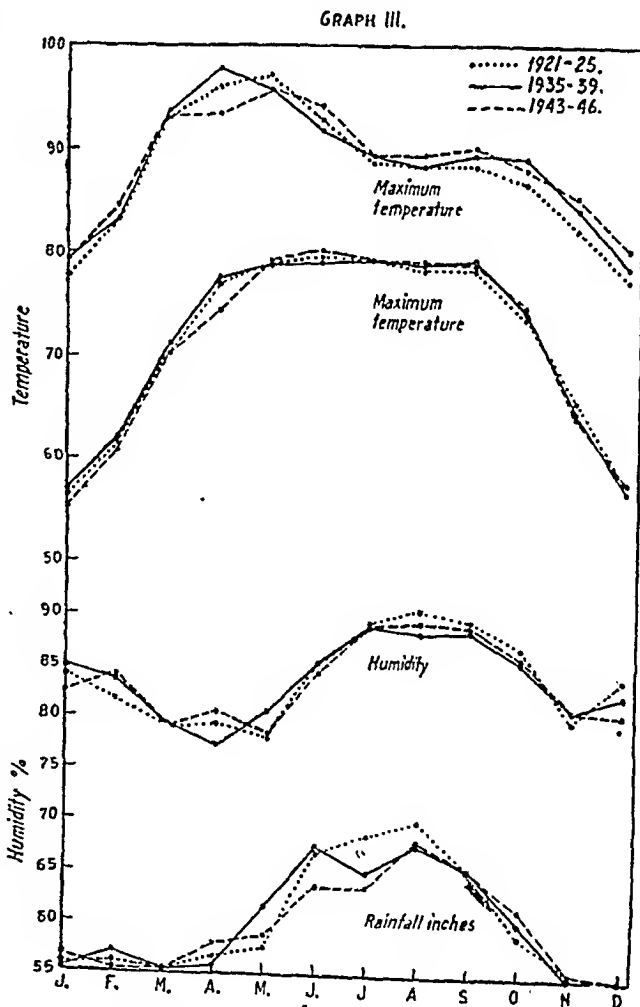
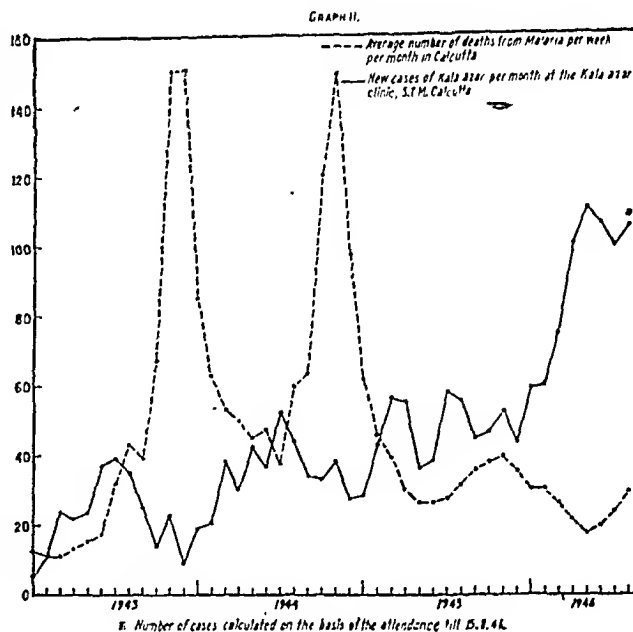
Enteric fevers.—The enteric group of fevers is regarded as one of the factors capable of dissemination of leishmanial infection from a quiescent focus of infection in the skin to the visceral reticulo-endothelial tissue, thereby establishing a general visceral infection, i.e. kala-azar. The enteric fevers are endemic in Calcutta and occur all the year round. In 1943 the worst affected areas were the wards 1, 9, 22 and 27 and the wards 3, 22 and 23 in 1944. These wards are not included in the kala-azar endemic area of Calcutta, and very few kala-azar cases were seen in these wards in 1944 to 1946. Though this finding does not in any way disprove the hypothesis about the importance of the enteric fevers in the production of kala-azar, the fact may be mentioned that there was no serious outbreak of enteric fevers in the kala-azar endemic area of Calcutta during the period preceding or coincident with the outbreak of kala-azar in 1944 to 1946.

Malaria.—Like the enteric group of fevers malaria is regarded as an important factor in the causation of a visceral dissemination of leishmanial infection from a quiescent focus in the skin of an individual bitten by an infected sand-fly. Epidemiological and cytological evidence was produced by Napier and his associates in support of this hypothesis.

In Calcutta there was a serious outbreak of malaria that began in September 1943; the peak was reached in October-November of the same year and though the number of cases came down considerably in December and still further in the following months the figures remained at a high level until September 1944, when another serious epidemic of malaria started. The peak of this outbreak was reached in November 1944, and then a sharp decline commenced in December 1944, and the normal level was reached in March 1945 (see chart 2). It will be seen that the increase in the number of kala-azar cases began in 1944, a high level was reached in 1945 and the rise continued to an even higher level in 1946. Though there was an outbreak of malaria preceding the rise of kala-azar in 1944 and 1945, there was no such increase of malaria

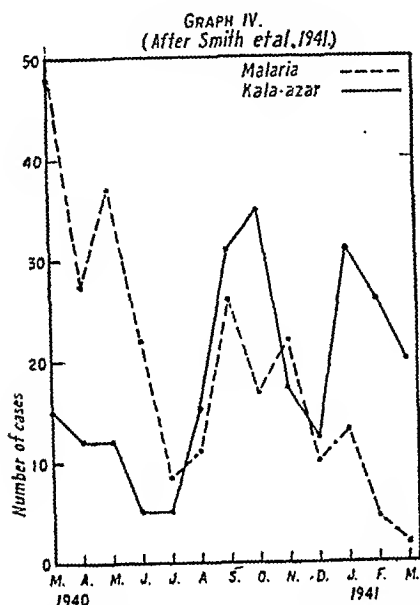
in 1945 preceding the further increase of kala-azar in 1946.

During 1943 the worst malaria affected areas in Calcutta were the District III, comprising of



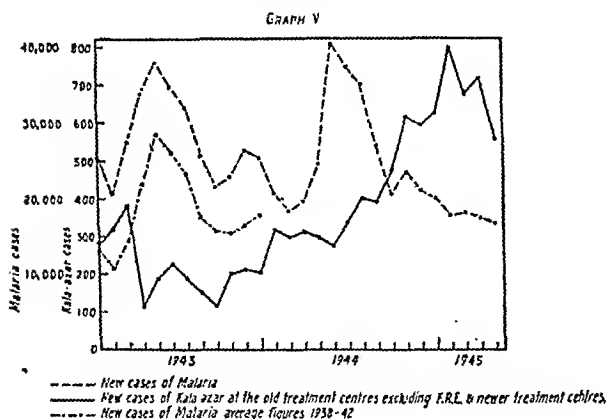
the wards 13 to 21, and the 'added areas' particularly the wards 28 and 29. During 1944, the worst affected areas were the wards 18, 28 and 29. The wards 28 and 29 constitute the

north-eastern fringe of the town. There was also a somewhat milder outbreak of malaria in the ward 24 in the south-western part of the city. From these areas in the north-eastern and south-western fringes of the city that were badly affected by malaria in 1943-44, increasing numbers of cases of kala-azar were seen in 1945-46. The wards 13 to 21 include the kala-azar endemic area of Calcutta from which also



a large number of indigenous cases of kala-azar was seen in 1944 to 1946.

It would thus appear that malaria was probably of importance in the causation of the outbreak of kala-azar in 1944 to 1946. But there appears to be a distinct time lag between the



outbreak of malaria and the onset of the epidemic of kala-azar. Such time lag was experienced by Smith and Ahmed (1941) who investigated the relationship between an outbreak of malaria and that of kala-azar in Bihar (see chart 4). The writer also had similar experience during his investigations of outbreaks of kala-azar in the Chittagong District in 1945 (see chart 5) and at Baniachang in the Sylhet District in 1947. In the latter village the indications were that an outbreak of kala-azar

commenced in 1944 after the grave epidemic of malaria of 1943 that is reported to have caused the death of 25 per cent of the total population of the village; and between January 1945 to February 1947, at least 4.5 per cent of the surviving population of the village showed evidence of well-developed kala-azar.

This time lag is presumably due to two factors: (1) the interval between the carrying of the parasitized histiocytes from the skin to the viscera, as a result of repeated attacks of malarial fever that leads to a well-marked mobilization of the histiocytes, and the onset of the symptoms of kala-azar; and (2) the duration of illness from kala-azar after which the patient comes under observation and is diagnosed as a case of kala-azar on the basis of the aldehyde test in most cases. The incubation period of kala-azar is generally regarded as two to four months though it is well recognized that the extreme limits may be anything from a few weeks to a year and a half; and most patients come for treatment after more than three months' illness, and the maximum after six months of illness from kala-azar (Napier, 1926). This explains the time lag of about 5 (if diagnosed by blood culture or other tests) to 8 months (if diagnosed on the basis of a positive aldehyde test) between the peak of an outbreak of malaria and that of kala-azar at its onset. Once the epidemic has started it progresses to the peak even in the absence of any other disease like malaria (see charts 2, 4 and 5).

The population factor, i.e. the presence of highly susceptible material in the population particularly in the form of children born since the last epidemic wave.

Napier showed that in India the incidence of kala-azar was the highest amongst the children below the age of 15 years and thus they constituted the highly susceptible material for infection. The peak of the last epidemic was in 1923 and Napier calculated that in 1943 the next epidemic wave was overdue by about five years and ascribed this to the treatment campaign against kala-azar (Napier, 1943). But if we examine chart 1, it is seen that the epidemic wave of the twenties terminated about 1929 and the interepidemic period commenced in 1930. If we calculate from the year 1930 the aggregation of the susceptible children below the age of 15, born from 1930 to 1946, is at the maximum from 1944 onwards. Thus in 1944 the soil for an outbreak was ready among the children born since the passing of the last epidemic wave.

In 1944 the susceptible material in the population was probably not made up of children alone. Food scarcity, famine, war-time conditions, and outbreaks of several diseases had in all probability rendered even the adult population relatively more susceptible to kala-azar. That older age groups were more frequently affected by kala-azar in 1946 was probably due to this factor and/or increased virulence of the parasite.

It thus appears that the presence of highly susceptible material in the population is an important predisposing factor in the causation of an outbreak of kala-azar.

Napier had pointed out that the population factor determines the extent and the duration of an outbreak of kala-azar; when all the susceptible material is exhausted the disease dies down. This is quite true for localized communities without much facilities for treatment. But under modern conditions the duration of an epidemic should depend entirely on the intensiveness of the treatment campaign and anti-sand-fly measures.

The question of increase of virulence of the parasite, Leishmania donovani

Though the possibility of increase of virulence of leishmania was suspected by other workers (Shortt *et al.*, 1931), it has not been established that the virulence of leishmania may be increased in an endemic area; but the findings made during this epidemic are in favour of this change having taken place. Actually there does not seem to be any reason why the virulence of leishmania, an infective organism, should not increase after several passages through very susceptible individuals. The evidences are that as a result of the factors the effects of which have been described above, the population of Calcutta was rendered very susceptible in 1943-44 and as a result of passage through this highly susceptible population, the virulence of the leishmania increased and the increase of incidence of 1944 progressed to an epidemic during the next two years. The progressive increase of incidence and of the severity of the disease was noticed from 1944 to 1946, and this fact supports the hypothesis of the increase of virulence of the parasite after passage through highly susceptible population, most of the other epidemiological factors, such as the war-time conditions, famine, epidemics of other diseases, etc., having ceased to operate in 1945-46.

Summary

A study of the trends of incidence, epidemiological and clinical data relating to a representative sample of the indigenous kala-azar affected population of Calcutta, showed that there was an outbreak of kala-azar in the city during the years following the Bengal famine of 1943. The disease was increasingly prevalent not in the endemic area of Calcutta alone, but also in the outskirts of the town that were affected by a serious outbreak of malaria in 1943-44. The peak of this epidemic was apparently reached about the middle of 1946. During this outbreak, the disease was more virulent in type than is usual during the inter-epidemic periods in Bengal; serious complications were more frequent and the older age groups were almost equally affected as the children.

Of the epidemiological factors that were concerned with this outbreak of kala-azar, the

aggregation of highly susceptible material in the population in the form of children below the age of 15 years born since the last epidemic and to some extent of the adult population affected by war-time conditions, famine, and epidemics of various other diseases, was of great importance. The effect of these factors, e.g. war-time conditions, food scarcity, and famine, was mainly to lower the body resistance of the population, increase the chances of close proximity between the infected and the unaffected individuals as a result of overcrowding, and providing excellent breeding grounds and shelter for the vector sand-fly, by the aggravation of the insanitary conditions in and around the dwellings of the poorer classes. The outbreaks of several diseases, viz cholera, small-pox, enteric and malaria, further lowered the body resistance of the people, and the last-named disease probably helped to light up the quiescent leishmanial infection in many individuals at the onset of the epidemic. The indications are that by the passage through this devitalized and highly susceptible population, the virulence of the parasite was enhanced and the epidemic was maintained and progressed to the peak even when most of the other epidemiological factors had ceased to operate.

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SEROLOGICAL TECHNIQUE (contd.)

By S. D. S. GREVAL

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DETAILS OF COMPLEMENT FIXATION IN HYDATID DISEASE

The Technique

The hæmolytic system.—This is taken from the LCF reaction, as in the case of complement fixation for kala-azar and leprosy observing the same rule of preference for the complement.

The antigen.—From carcasses of freshly slaughtered infested sheep fluids from a dozen or so hydatid cysts are collected by aspiration with a syringe in separate bottles. The needle is left *in situ* while the syringe is filled and discharged into a bottle. Finally the needle is made to scrape the cyst wall and the contents aspirated for preparing a slide for microscopic examination. The scoleces must be demonstrated before a fluid is accepted for the test.

To each bottle is added on the spot 0.5 per cent (or a little over, up to 0.6 per cent) of a mixture of equal parts of ether and trikresol. (For small quantities drops from a standard capillary pipette delivering 50 drops to 1 c.c. are used. Each drop equals 0.02 c.c. Such a pipette is made by fitting the point in hole no. 58 of wire gauge of L. S. Starrett Co., U.S.A. The required percentage of trikresol can be added by this pipette to quantities as small as 0.5 c.c., by diluting the antiseptic with more ether). The bottles are shaken vigorously, brought to the laboratory and left in a refrigerator overnight. Next day each fluid is tested for anticomplementary and hæmolytic activity. One volume of it should not interfere with 1 MHD of complement (antigen 1 vol. + saline 1 vol. + complement 1 MHD in 1 vol. . . . incubation . . . + sensitized rbc 1 vol. . . . incubation = almost complete hæmolysis) and 3 volumes should not hæmolyse 1 vol. of sensitized rbc suspension (antigen 3 vol. + sensitized rbc 1 vol. incubation = no hæmolysis). The fluids not conforming to the standard or discolouring the rbc are rejected.

At least 6 selected fluids are pooled to yield a standard antigen which remains stable in a refrigerator at least for a year. For use the bottle is shaken, the coarse particles allowed to settle and the uniformly opalescent fluid removed.

The serum. 1. *Under test.*—It is inactivated and diluted 1 in 10, 1 in 50, 1 in 100 and 1 in 200.

2. *Known positive.*—A positive serum of a known titre diluted 1 in 10 with saline containing 0.25 per cent trikresol is kept in the refrigerator. It keeps well and need not be re-inactivated unless it has turned anti-complementary. As the sera for the test are not received frequently such a serum may at times be not available. Reliance then must be placed on 6 negative controls, 3 LCF positive and 3 negative. Serum from a case of gonorrhœa, if available, is also included.

3. *Known negative.*—For reasons given above many controls may be necessary. The sera need not be re-inactivated if they have been used in other tests the same day. One LCF positive control, from a case known to be free from hydatid diseases, is always included.

Charging of tubes.—Five tubes are required for each case and charged thus:—

A column

All tubes contain complement with 2 MHD contained in 1 volume.

5th row tube with :	Serum 1 in 200, 1 volume. Antigen, 1 volume.
4th row tube with :	Serum 1 in 100, 1 volume. Antigen, 1 volume.
3rd row tube with :	Serum 1 in 50, 1 volume. Antigen, 1 volume.
2nd row tube with :	Serum 1 in 10, 1 volume. Antigen, 1 volume.
1st row tube with :	Serum 1 in 10, 1 volume. Saline (no antigen), 1 volume.

(Antigen and complement are mixed and delivered as a double volume after the serum has been delivered, except, of course, in the 1st row tube which contains no antigen.)

Left at room temperature and incubated as in LCF.

Sensitized rbc, 1 volume, added to all tubes. Incubated $\frac{1}{2}$ hour.

An antigen control is included for the day's work. It consists of (i) antigen 1 vol. + (ii) comp. 1 MHD + (iii) saline 1 vol. It is left at room temperature and in the incubator like the rest of the tube and tested for loss of complement by adding rbc suspension 1 vol. There should be no loss. The rbc should be almost completely hæmolyzed.

Reading of results.—The results are read (i) immediately for \pm and $-$ and (ii) next day for $+$ and T after the tube has stood in the ice-box overnight. A $?$ — is ignored.

Record and report. 1. *When the serum control (1st row tube) is fully hæmolyzed.*—A $+$ is reported as 'Positive in 1 in 200', 'Positive in 1 in 100', 'Positive in 1 in 50' or 'Positive in 1 in 10'. A T or \pm in the 2nd and 3rd tube is recorded as such under each tube but reported as 'Doubtful'.

2. *When the serum control is partially hæmolyzed \pm .*—A $+$ in the 3rd row, 4th row

or 5th row tube is reported as 'Positive in 1 in 50', 'Positive in 1 in 100' or 'Positive in 1 in 200'. For a + in the 2nd row tube only the serum must be diluted and tested until the 1st tube is fully hæmolyzed.

3. When the serum control is not hæmolyzed at all or shows only a trace of hæmolysis (T).—The serum must be diluted and tested until the serum control is fully or partially hæmolyzed.

Observations on the Technique

Limitations of the technique.—Unlike what obtains in syphilis, kala-azar and leprosy, the limit of reaction of the sera from cases of hydatid disease is not known. The antigen has not been standardized by selection with respect to its sensitiveness. That is why degrees have not been assigned to the reaction. By stating the strength of the serum dilution which gives a + reaction, however, a comparison is possible.

Special features of the technique.—There are four such features: (1) The antigen is selected with respect to its hæmolytic and anticomplementary activity, pooled, and preserved. The pooling makes the antigen polyvalent and the preserving relatively constant. (2) The serum is tested routinely in four well-spaced dilutions. (3) The dose of the complement is constant. (4) The complement of a poor quality, as determined in its titration in the LCF for syphilis, is not used. This restriction on the complement ensures obtaining of repeatable results in weak reactions.

REPETITION OF THE REACTION

For technical reasons.—From what has been said concerning the preference for the qualities of the complement, it follows that a doubtful reaction not in accordance with clinical expectation or not giving enough aid in diagnosis should be repeated with a complement of a better quality (if an inferior quality has been used before) in order to obtain more fixation. This is necessary in view of the fact that adjustment like those in the LCF are not made in this reaction.

The repetition is also indicated when the MHD of the complement selected for the LCF has given a fixation rather on the low side in that reaction.

Enough serum should be available for the repetition from the original sample. If a fresh sample be necessary the preparatory measure of taking the blood early in the morning, before any food has been taken, if ignored previously, should be enforced now.

For observing the course of the disease.—Fresh serum will, of course, be necessary for observing, increasing or decreasing fixation, with treatment other than surgical. The author believes that the hydatid disease undergoes spontaneous cure in India.

INCIDENCE OF COCCIDIOSIS IN THE ARAKAN

By N. N. MUKHERJEE
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SINCE the discovery of *Isospora hominis* by Kjellberg, Virchow (1860), Railliet and Lucet (1890), Woodcock (1915) and Wenyon (1915), various workers reported about 200 cases from various parts of Europe, Asia, Africa and America. The highest figure of incidence recorded in one zone is 32, which was from Eastern Mediterranean. The following records of cases are available from East Asia according to Wenyon:—

Noc (1920) reported a doubtful case from Saigon.

Brug (1922) reported four cases from Java.

Pons (1925) reported another two cases from Saigon.

Boon van Ostade (1923) reported a case from Malay.

Wassell (1923) reported a case from China.

Knowles (1924) reported five cases from Calcutta.

Das Gupta (1934) encountered one case in Calcutta.

Galliard (1936) found a case of pure infection in Saigon.

Pons, Dufosse and Legar reported a number of cases in Europeans only from Indo-China.

Writer's own observations.—The writer in the Arakan on the Eastern Frontier of South Bengal encountered 14 cases during a period of about 7 months and the findings are condensed in the table appended. During this period, examinations of more than 6,000 specimens of stool were undertaken from over 1,000 cases, both British and Indian soldiers fighting in this area. Twelve cases out of 14 were diagnosed by direct examination of stool slides and the remaining 2 (cases 9 and 11) by Sheather's concentration method (sugar flotation). Duodenal fluids were examined in 2 cases (cases 8 and 12) with negative results. A series of more than 50 cases of diarrhoea showing Charcot-Leyden crystals and fat were examined by Sheather's concentration method without any promising result. Charcot-Leyden crystals, fairly constant in this infection, were absent in 2 cases (cases 5 and 13). Fatty acid crystals and fat globules were present only in 3 cases (1, 3 and 8). Most of the cases except cases 2, 5 and 6 had loose, light coloured stools with undigested food material. All the cases were confined to British troops. Practically all the cases were from units in the same area, and occurred between the months of May and October and the peak of incidence corresponded to the peak of the monsoon.

Summary of findings in 14 cases of Coccidiosis

Case number	Date	Exudate	Associated pathogenic organisms	Duration of infection	Clinical symptoms
1	23-5-44	Nil	<i>Giardia lamblia</i> . <i>Trichomonas hominis</i> .	2 days	Diarrhoea, slight abdominal discomfort, not very ill.
2	9-6-44	Indefinite	Nil	12 days	Acute dysentery, great abdominal discomfort. Very ill. Stay in hospital 38 days.
3	10-7-44	Nil	Nil	1 day	Diarrhoea, bulky and frothy stool, slight abdominal discomfort. Not very ill.
4	2-8-44	Nil	<i>Ascaris</i> ova	2 days	Diarrhoea, slight abdominal discomfort, not very ill.
5	7-8-44	Indefinite	Nil	20 days	Acute dysentery, great abdominal discomfort, very ill, stay in hospital 26 days.
6	16-8-44	Indefinite	<i>Trichomonas hominis</i>	1 day	Mild dysentery, moderate abdominal discomfort. Not very ill. Stay in hospital 8 days.
7	28-8-44	Nil	<i>Ascaris</i> ova	2 days	Diarrhoea, moderate abdominal discomfort. Moderately ill.
8	29-8-44	Nil	<i>Ascaris</i> and ankylostome ova.	8 days	Diarrhoea, bulky, frothy stool. Moderate abdominal discomfort. Moderately ill.
9	1-9-44	Nil	Nil	1 day	Indigestion and very slight abdominal discomfort. Patient did not look ill at all.
10	5-9-44	Nil	<i>Ascaris</i> and ankylostome ova. <i>Trichomonas hominis</i> .	1 day	Diarrhoea, moderate abdominal discomfort. Moderately ill.
11	15-9-44	Nil	<i>E. histolytica</i> (vegetative).	1 day	Chronic diarrhoea, moderate abdominal discomfort. Moderately ill.
12	17-9-44	Nil	Nil	2 days	Diarrhoea, slight abdominal discomfort. Not very ill.
13	16-10-44	Nil	Nil	1 day	Mild diarrhoea. No abdominal discomfort. Patient did not look ill at all. Stay in hospital 2 days.
14	5-12-44	Nil	<i>Ascaris</i> and <i>Trichuris trichura</i> ova. <i>Trichomonas hominis</i> .	21 days	Diarrhoea, moderate abdominal discomfort. Moderately ill. Stay in hospital 21 days.

Conclusion.—

1. Fourteen cases in 7 months appear to be a high incidence in this area as compared with the figures reported from other areas.

2. All cases from the same area are suggestive of endemicity of the infection.

3. Practically all the cases were confined to the British troops which is suggestive of racial susceptibility.

4. Most of the cases occurred during monsoon suggesting a seasonal prevalence.

5. Though usually it is a mild infection without much distress, acute dysentery with prolonged illness is not uncommon.

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INTRAPLEURAL PRESSURES IN CONGESTIVE HEART FAILURE

By P. N. LAHA

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THE present work consists of the measurement of intrapleural pressures in patients suffering from various degrees of congestive heart failure and the effect of digitalization on the same. The modified Lillingston and Pearson pneumothorax apparatus was used. The site chosen was the sixth space in the anterior axillary line either on the right or the left side. Diet, administration of digitalis, etc., were standard for each patient.

Results are tabulated below.

Conclusion

In congestive heart failure both the inspiratory and the expiratory intrapleural pressures are diminished in the majority of cases, the normal intrapleural pressures during inspiration

TABLE

Number	Name	Age, race and sex	Degree of heart failure	Intrapleural pressure in cm. water before digitalization			Response to digitalis	Intrapleural pressure in cm. water after digitalization		
					Mean				Mean	
1	B.	40, H.F.	++++	- 6,	+ 4	- 1	Good	- 11,	- 7	- 9
2	G.	26, H.M.	+++	- 7,	- 1	- 4		- 13,	- 5	- 9
3	S.	50, H.M.	+++	- 5,	0	- 2.5	L.B.D.	..	..	..
4	F.	40, M.F.	+	- 14,	- 2	- 8	"	..	..	..
5	R.S.	20, H.F.	+	- 8,	- 2	- 5	Good	- 10,	- 4	- 7
6	N.	50, M.M.	++++	- 7,	+ 4	- 1.5	Nil	- 6,	+ 1	- 2.5
7	S.	14, H.F.	+	- 11,	- 6	- 8.5	L.B.D.	..	..	..
8	R.S.	40, H.M.	++++	- 7,	+ 3	- 2	Nil	- 7,	+ 2	- 2.5
9	S.	50, H.M.	+++	- 6,	- 3	- 4.5	Good	- 10,	- 3	- 6.5
10	B.	50, H.M.	+++	- 8,	- 5	- 6.5	"	- 12,	- 4	- 8

++++ = Very severe.

+++ = Severe.

++ = Moderate.

+ = Slight.

H.M. = Hindu male.

H.F. = Hindu female.

M.M. = Muslim male.

M.F. = Muslim female.

L.B.D. = Left before digitalization.

Note.—The plus pressures during expiration were checked and confirmed after introducing 50 c.c. of air into the pleural space.

and expiration being —14 to —3 cm. water and —10 to 0 cm. water respectively (Laha, 1946). Clinical improvement after digitalization is associated with increase of these figures and vice versa. This can be explained by the fact that in congestive heart failure the lungs become oedematous which means they are less elastic. After digitalization the pulmonary oedema disappears or becomes less and with it the pressure increases. Correct explanation of the positive expiratory pressure in a few of the cases in the present series does not seem

to be available. The degree of heart failure is reflected in the range of intrapleural pressures.

Acknowledgments

My thanks are due to the Superintendent, Thomason Hospital, Agra, for his kind permission to publish the work. I must thank Dr. B. K. Dube, M.D., Lecturer in Therapeutics, Agra Medical College, for allowing me to study the cases of heart failure under him. I wish to express my appreciation of the services of the house physicians and the nursing staff.

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A Mirror of Hospital Practice

RUPTURE OF THE UTERUS

By T. D. RAJOO, L.M.

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CLIFFORD WHITE says that the rupture of the uterus falls into 3 main groups, occurring: (1) as an end result of obstructed labour, (2) as a result of injudicious operative midwifery, and (3) as a result of the yielding of a scar in the uterus. The first group, he says, arises from neglect of the patient and hence is rarely seen in civilized countries.

During the last 6 months 2 cases of rupture of the uterus due to obstructed labour and mis-handling by barber midwives were admitted into the hospital.

Case reports

Case 1.—A 2nd para, 28 years old, in labour for more than 24 hours, was admitted in a state of shock with anxious expression. Temperature 99.2°F. Pulse 120 p.m. Abdomen distended. Fœtal parts could be felt easily per abdomen and

the vertex at the vagina. The uterus could be palpated distinctly as a separate mass. Rupture of the uterus was diagnosed. After treating the patient for shock, the abdomen was opened with local anæsthesia supplemented with ether and oxygen. The fœtus and placenta with a fair amount of blood were found in the abdominal cavity. Though the head was in the vagina, the fœtus and placenta were removed without any difficulty. The blood in the peritoneal cavity was filtered, citrated and was given intravenously. There was a big complete tear of the uterus extending from the lower uterine segment to the body of the uterus. Sub-total hysterectomy was done. The patient stood the operation well. Before starting the operation the patient was put on 20,000 units penicillin three hourly and in all she had 8 lac units and 40 grammes of sulphadiazine by mouth. She had temperature for some days. The bladder was infected with *Bacillus coli*. She was discharged cured 5 weeks after admission. (1st delivery normal. Child died soon after birth.)

Case 2.—A fourth para, 30 years old, in labour for more than 24 hours was admitted in a state of collapse. Temperature 97.4°F. Pulse 128 p.m. Transverse presentation with hand and cord prolapsed. The other foetal parts could be felt easily per abdomen. A macerated male child weighing 5½ lb. was delivered easily by internal podalic version. Placenta was removed. The patient was put on glucose saline intravenously, 20,000 units penicillin three hourly, coramine and pituitrin four hourly. The following day—24 hours after admission—as her general condition had improved, the abdomen was opened under ether and oxygen. A big complete tear extending from the lower uterine segment to the body of the uterus was seen. Sub-total hysterectomy was done. After few days she developed lobar pneumonia on the right side and the bladder also was infected with *B. coli*. She was discharged cured 6 weeks after admission. The patient had 8 lacs of penicillin and 40 grammes of sulphadiazine. (Three deliveries normal. Two children died after some months.)

Penicillin is a great boon to cases of this type. Before penicillin days, the mortality rate was very high.

I am grateful to Col. M. P. Atkinson, I.M.S., for allowing me to report these two cases.

A CASE OF AMOEBIC PERICARDITIS

By J. M. F. D'MELLO
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Rupture of an amoebic abscess of the liver into the pericardial cavity has been recorded on rare occasions. Two recent cases have been reported in the *Indian Medical Gazette* of July and August 1946, in which a definite pericarditis had been established by finding the *E. histolytica*. A similar case has come under my observation recently. The patient was admitted to hospital on 1st August, 1946, while he was on leave. He complained of diarrhoea and fever. He had been treated for dysentery about two months previously and once in 1940, but stated that he was never quite free from symptoms. He was an emaciated individual of 30 years of age. On examination a hard mass was palpated in the epigastric region extending from the right costal margin across the middle line to the left hypochondriac region. The left edge of this mass was sharp and fairly hard. His temperature on admission was 99°F., pulse rate was 120, and respiration rate was 22. Heart sounds were normal. The normal tympanitic note over Traube's area was absent. The lungs showed no abnormality. Examination of the stools revealed blood and mucus and numerous vegetative *Entamoeba histolytica*. The morning after admission the patient complained of giddiness and of pain in the sternal region, collapsed suddenly and died.

Autopsy findings

The body was that of an emaciated male of about 30 years of age. Rigor mortis was not present.

Neck and thorax

Lungs and pleura.—There was no pleural effusion. The right lung was almost completely adherent to the parietal pleura. Both lungs appeared normal.

Heart.—On opening the pericardial sac a purulent fluid resembling anchovy sauce welled out. About 6 oz. of pus were present. An aperture was found in the inferior surface of the sac and through this aperture the pus was entering. The aperture was 3 mm. in diameter. The epicardium showed small raised inflammatory areas. No definite ulceration was evident. The heart was not opened as it was decided to preserve the specimen *in toto* (see note under 'Liver').

Esophagus and trachea.—No abnormality was noted.

Abdomen.—No free fluid or pus was seen in the peritoneal cavity.

Liver.—This organ was larger than normal and its lower border was about three inches below the costal margin on the right side. The left lobe was found to consist of a large abscess cavity and its upper surface was completely adherent to the diaphragm. The pus had evacuated itself through the perforation into the pericardial sac during manipulation at the autopsy and hence the lower border of the left lobe was not apparent below the costal margin when the abdomen was opened, as the abscess cavity had collapsed. About 1½ pints of pus were collected from the liver abscess. The cut surface of the right lobe showed congestion.

Spleen was normal in size and showed no gross abnormality in its cut surface.

Kidneys.—Both were normal in size. The cut surface was very congested. Their capsules stripped easily.

Stomach.—No abnormality was seen.

Small intestine.—Mucosa appeared congested. No ulceration was seen.

Cæcum.—The whole cæcal wall was much thickened. The mucosa showed numerous deep punched-out ulcers covered over the yellowish sloughs.

Large intestine.—Numerous typical amoebic ulcers were present throughout its length right down to the sigmoid colon.

Other organs showed no gross abnormality.

Morbid histology

Liver.—Sections through the abscess wall showed a thick outer layer of connective tissue and an irregular layer of necrotic liver cells. *Entamoeba histolytica* were seen among the necrotic liver tissue and also in the connective tissue wall.

Cæcum.—A section through an ulcer showed an old amoebic infection. The submucosa was thickened and contained many *E. histolytica*.

Heart.—Muscle fibres adjacent to the epicardium showed cloudy swelling. The epicardium showed fibrinous flakes on its surface. The sub-epicardial area was infiltrated with mononuclear cells and showed a coagulative necrosis. *Entamoeba histolytica* were seen in this layer. A round cell infiltration was also evident in some places in the sub-epicardial layer but was not pronounced.

Commentary.—The cause of death was rupture of an amoebic abscess of the liver into the pericardial cavity. The interesting point is that there had been a leakage of amoebic pus into the pericardium for some days prior to death as was evidenced by the microscopic lesion of the epicardium—in other words an amoebic pericarditis had been established.

Acknowledgment

My thanks are due to the Director of Medical Services, G.H.Q., India, for permitting me to publish this report.

OXYTOCIC ACTION OF NEPTAL

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A WOMAN, age 35, 6th para, 8 months, was admitted for general anasarca. She was intensely anæmic, conjunctiva pale as paper, earthy colour of skin, pitting œdema from face down to dorsum of feet, with some fluid in the abdomen, labia majora were like ovoid blisters and giving rise to great discomfort. There was a blowing murmur in all areas of cardiac region and distress in breathing.

She was given 2 c.c. of neptal intramuscularly at 6 p.m. on the second day of stay in hospital. At 7 p.m. she went into labour and at 10 p.m. was delivered of a male baby, puny and probably about 4 lb. in weight—no weighing machine available. She urinated profusely and by 9 a.m. next morning was so shrivelled up as to be unrecognizable. Mother and baby are well at the time of writing. Treatment for ankylostomiasis is being initiated.

The leaflet in the box of ampoules—the only literature at hand to consult—does not mention any action of this drug on the uterus and that is why this note is sent for publication to invite the attention of the profession to it, and confirm or refute my inference.

Therapeutic Notes

NOTES ON SOME REMEDIES

XV.—DRUGS IN SYPHILIS (contd.)

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III. Cardiovascular syphilis

SYPHILIS attacks the blood vessels after a long latent period, and then the brunt of the

attack falls on the aorta at its origin. It is a chronic inflammatory process of the vessel wall leading to dilatation and regurgitation or anginal attacks by implicating the mouths of the coronary arteries. In the past too energetic treatment with powerful remedies was the cause of rapid heart failure from the Herxheimer reaction or proved too toxic for the already damaged heart. In other cases it was followed by immediate clinical improvement and then by a downhill course ('therapeutic paradox') caused by rapid resolution of the syphilitic tissue with the resulting scarring and fibrosis of the aorta. Treatment should therefore be cautious, even in uncomplicated aortitis, with the insoluble bismuth and iodides, the doses being gradually increased according to tolerance. After three months of this treatment NAB may be started with a dose of 0.15 gm. gradually increased up to a maximum of 0.3 gm. If no unfavourable reaction occurs the arsenical course is completed with 10 or 12 injections. After an interval the patient requires another similar treatment and thereafter annually a course of bismuth followed by arsenic unless signs of heart failure develop. Provided that the disease is not advanced, its progress may be arrested by the above treatment. In aortic regurgitation it is most important to avoid any reaction. Acetylarsan is a convenient preparation for this condition, but in the U.S.A. bismarsen is more popular. No arsenic should be used in the presence of true angina, dyspnoea or congestive failure and in such cases it is better to use mercury instead. Penicillin is not recommended in cardio-vascular syphilis, as sufficient data are not yet available.

IV. Neuro-syphilis

Broadly speaking, there are two main types of lesions: (1) meningo-vascular, e.g. gummata, meningitis, vascular disease causing thrombosis, and meningo-myelitis, and (2) parenchymatous, in which the main changes are in the nerve cells and fibres and which includes tabes dorsalis and general paralysis of the insane. Neuro-syphilis may be asymptomatic when the only sign is an abnormal spinal fluid. Vascular lesions respond well to energetic treatment which is begun with bismuth (or mercury) and iodides followed after a month by NAB and bismuth for ten weeks. Four such courses are given in a year and thereafter depending on clinical and serological improvement the patient will probably require at least one course a year for several years as a safeguard against recurrence. In acute cases, e.g. severe meningitis, it is important to avoid intensive treatment and not to use arsenicals until the patient is under the influence of bismuth and iodide as this may lead to a reactionary increase of the syphilitic process.

In parenchymatous syphilis, damage to the nervous tissue beyond a certain point cannot be

made good and residual symptoms tend to persist even when the syphilitic process is burnt out. While favourable results may not be expected in more advanced cases, tryparsamide and bismuth may arrest deterioration and contribute to the prolongation of life when treatment is begun sufficiently early and continued over a long period. Courses of tryparsamide 30 gm. and bismuth 2 gm. are given four times in a year and iodides are given in the intervals. In assessing their value in *tabes dorsalis* it must be remembered that the natural progress of this disease is variable and it may undergo spontaneous arrest at any stage. In general paralysis pyrexial therapy is the most efficacious mode of treatment so far available. This may be achieved by infecting the patient with benign tertian malaria and allowing him to have up to 12 rigors before exhibiting quinine or by placing him in an apparatus in which he is electrically heated until a temperature of 104°F. and upwards is reached and maintained for 6 to 8 hours on ten occasions. The treatment is valuable in early cases but should be given only in an institution. After fever therapy the patient must be put on tryparsamide and bismuth.

Penicillin in neuro-syphilis

Experience of penicillin in neuro-syphilis is based mainly on the 'standard' course which consisted in giving altogether 2,400,000 units in 7½ days; it will probably have to be revised in view of the present tendency to use large dosage with or without arsenic and bismuth. Its effectiveness seems to depend on its ability to reach the diseased meninges, blood vessels and parenchyma and though it does not appear in the cerebrospinal fluid in significant quantity it exerts a favourable effect on it with regard to cell and protein contents. The Wassermann reaction of the fluid tends to become negative, but that of the blood remains unchanged especially in the parenchymatous forms. Before starting penicillin it is better to give a few injections of bismuth in view of the known risk of Herxheimer reaction. Best clinical results have been obtained in meningo-vascular syphilis but the late form which occurs long after infection often resists treatment. Both *tabes dorsalis* and general paralysis improve at first but the clinical and serological improvement is not maintained unless the treatment is followed by prolonged arsenic and bismuth in one case and malaria therapy in the other. Promising results have however been described in the U.S.A. following injections of penicillin alone but further time must elapse before these results can be finally assessed.

V. Syphilis in pregnancy

The clinical manifestations are often suppressed when the disease is acquired during pregnancy, no primary stage may be noted and

the secondary lesions are either slight or absent. This latency may persist for many years in spite of treatment.

Treatment should be energetic and repeated at each pregnancy whether the blood test is positive or negative. The drugs are well tolerated and can be administered up to the eighth month of pregnancy, but the doses of NAB and bismuth should be limited to 0.3 and 0.15 gm. respectively. With early and adequate treatment the prognosis is quite good. Penicillin will probably prove to be the drug of choice in this condition. As it passes through the placenta it may help in preventing congenital syphilis.

VI. Congenital syphilis

The infection occurs *in utero* in the latter half of pregnancy. The lesions are most often seen in the first six months but may appear in later childhood. The prognosis is good especially when treatment is begun in the first period, but interstitial keratitis is very resistant and neurological involvement is almost a hopeless condition. Treatment follows the same general line as in adults. As a rule children tolerate the drugs well, but as they are frequently debilitated, the dosage should be calculated according to weight rather than age. For severely affected or premature infants it is better to start with acetarsol by mouth or bismuth by injection. When acetarsol is used it is given daily in gradually increasing doses (from 0.005 to 0.020 gm. per kg. body weight) for ten weeks, and then the course is repeated three times with a four weeks' interval between each course. In less severely affected infants treatment may be commenced with sulpharsphenamine by intramuscular injection in doses of 0.01 gm. per kg. Whenever possible a change should be made over to neoarsphenamine. Bismuth is given either concurrently or alternately in doses of 0.005 mg. per kg. The inunction of mercury is of value, but less effective than bismuth. Iodides are not well tolerated in infancy.

The continuation of the treatment will depend on the local and general condition and a return of the Wassermann reaction to negative, but a minimum of two years' treatment is advised. The patient must be under observation for some years as relapses sometimes occur.

The immediate results of penicillin in congenital syphilis are very gratifying but the best methods of its use have not yet been satisfactorily settled. Reactions are frequent but mild and consist of fever and transient urticaria. The total dosage varies from 16,000 to 32,000 units per kg. body weight, but recently larger doses are being given. To avoid undue reactions some recommend a course of arsenic or bismuth for the first two weeks and then penicillin every three hours for five days.

Indian Medical Gazette

DECEMBER

AIR TRAVEL

Air lines are competing successfully with railways, as far as the higher income level traffic is concerned, in spite of occasional crashes. Such is the need for speed in the post-World War II days. (Incidentally, the expectation of life rose after the World War I and is bound to rise further after all the experiences of medicine, surgery and nutrition gained during the World War II have been incorporated in the daily routine of the citizens: There should be less need for hurry. The love of speed is partly a craze and partly an escape from the post-war discomfort of trains and ships. Be that as it may, air travel has come to stay like cocktails, night clubs and all the evils appertaining thereto. The number of new air fields—completed, under construction or under contemplation since 15th August, 1947—is astounding.)

Concerning the passenger.—Every air-minded passenger is not air worthy. Serious dangers arise from alteration in the atmospheric pressure and reduced oxygen pressure, and minor dangers from unaccustomed movements interfering with the body balance. A heavy aircraft provides a smooth motion and eliminates most of the difficulties of the unaccustomed motion.

The lack of air worthiness, due to the minor dangers, on the whole is lower than that of sea worthiness, if the excitement be excluded. The treatment of air sickness is the same as that of sea sickness. Subjects who are sea sick and car sick (while going uphill) are also air sick in a plane. Babies tolerate flying very well. Their bottle feeds may be prepared beforehand, carried chilled in a thermos flask and warmed in the plane when required.

The serious dangers arise from anoxæmia and pre-existing diseases. The anoxæmia gives rise to the *syncope of high altitude* (Hyman, 1947). Usually above 16,000 feet *altitude sickness*—tachycardia, tachypnoea, headache, lassitude, euphoria, nausea and vomiting—may occur. Syncope may supervene. Untreated syncope can kill. The pre-existing diseases deserve the attention of the family physician. They are: (1) Sinus and ear diseases. The infected sinuses may be emptied during ascent to be closed worse than before, afterwards. There may be a pain over the sinus and in the teeth, *aerodontalgia* (Shillito, 1947). Eustachian tubes may get congested if upper respiratory infection is present. Distortion of the drum of

the ear produces *aero-otitis*. Nasoconstrictor drug before and politization afterwards are useful. Chewing of gum and the associated swallowing movements during the flight are helpful. A person unable to swallow or an unconscious person may have serious damage done to the drum (Fulton, 1946). (2) Cardiac conditions. Ambulatory cases will not be affected much. Cases of angina will be affected by the concomitant hurry and worry of air travel. Patients who are unable to walk with comfort should not travel by air. Even the slight strain of 8,000 feet altitude may kill them. If they must travel oxygen must be provided. (3) Anæmia. Red blood count below 2.5 million is a contraindication. (4) Pulmonary conditions. Cases of asthma may give trouble if an attack occurs in the air. Diffuse fibrosis of lungs is serious only if it produces dyspnoea on slight exertion. Pneumothorax is a definite contraindication. Patients have died from displacement and distortion of the pericardium during ascent, from expansion of the air in the pleural sac. (5) Pregnancy. Until the last month a healthy woman is not affected much. (6) Disease of the nervous system. Mental patients are difficult everywhere. This difficulty is increased in the air. Cases of tabes should not be so carried that the unnatural movement interferes with their re-education in acquiring a sense of balance through vision. For this purpose air travel is to be preferred to a sea voyage because of its shorter duration. For professional aviation tabes is a bar (Ironsides and Batchelor, 1945). (7) Marked abnormalities of blood pressure.

Most of the difficulties of the reduced atmospheric pressure are eliminated in the 'pressurization' of the planes. In this process compressed air is discharged into the cabin to make up for the rarefaction of the air. So far only partial pressurization has been attempted by some air lines. When every plane is fully pressurized no patient will be barred. The Churchill egg illustrated in the daily press (Daily Press, 1948) was a pressurized cabin.

Concerning the staff.—The staff of the air lines are the responsibility of the 'flight surgeon' as the medical officers of the air lines are called (Bauer, 1943). Every employee of an air line is not air worthy. Every pilot, who of course is air worthy, is not capable of flight for more than a certain number of hours in a week. Flights give rise to symptoms which are the concern of aviation neuro-psychiatry. They may be a medico-legal problem at times. Medical men, other than flight surgeons, interested in such problems will find the necessary informations on regulations concerning the physical examination of the pilots, and their equipments and requirements.

In matters of physical fitness, equipment and requirement there is no comparison between the pilots and the passengers.

Concerning epidemiology.—Special precautions are necessary in excluding infected cases in the incubation period. So far yellow fever has been kept out of India by the vigilance of the public health authorities who do not allow any mosquitoes and uninoculated passenger from yellow fever zone to enter. Perhaps other influences are also at work : (1) The diseases may not thrive in India. There are many infectious diseases especially those of the nervous system which do not thrive in India. (2) The disease may be occurring in some other form, e.g. dengue fever. That the health department has succeeded 100 per cent in excluding a disease appears to be too good to be true.

Concerning special additions to the medical curriculum.—The textbooks include an account (Fulton, loc. cit.; Conybeare, 1946). The principles of physics, physiology and morbid anatomy, responsible for the discomforts and the dangers are simple and well known, so far as the passenger and his family physician are concerned. They will be treated like other new items in medicine by teachers in medical schools and colleges, and a place found for them. No specified special addition to the curriculum is necessary.

The 'flight surgeon' will learn his speciality as the military and naval surgeons learn their specialities. No responsibility rests on the medical schools and colleges. The over-burdened medical student's back should be spared the last straw.

These observations would not have been necessary had we not been asked recently to publish special communications stressing the need for additions to the medical curriculum. We have not published them because we do not approve of them. In fact we disapprove of them strongly.

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PRIZE FOR AN ESSAY ON SIMPLE NON-INFLAMMATORY GLAUCOMA

ON p. 743 in this issue will be found an announcement of ophthalmological interest. Papers on 'Simple non-inflammatory glaucoma' are invited. An honorarium of \$1,000 awaits the writer of the best paper.

INTERNATIONAL FORMS OF CERTIFICATES OF VACCINATION AGAINST SMALLPOX AND INOCULATION AGAINST CHOLERA AND YELLOW FEVER

ON page 743 of this issue will be found a note on the above subject issued by the office of the Director-General of Health Services, New Delhi, as well as the prescribed forms for smallpox vaccination and cholera inoculation. Their importance to the medical practitioners and travellers going abroad is obvious.

ERRATA

THE PASSING OF THE I.M.S.

In the *Indian Medical Gazette*, vol. 82, no. 6, July 1947, page 414, line 3, for 'it' read 'they'.

STREPTOMYCIN

In the *Indian Medical Gazette*, vol. 82, no. 11, November 1947—

page 675, line 29, for 'Truat' read 'Truax'.
 page 676, under References, item 8, for 'Truat' read 'Truax'.

Medical News

INTERNATIONAL FORMS OF CERTIFICATES FOR VACCINATION AGAINST SMALLPOX AND INOCULATION AGAINST CHOLERA AND YELLOW FEVER

(Issued by the Office of the Director-General of Health Services, New Delhi)

ACCORDING to international requirements, certificates of inoculation and vaccination against cholera, smallpox, typhus and yellow fever must be in the internationally prescribed form. Copies of prescribed forms can be obtained from the nearest Administrative Medical Officer. These forms should be filled in by the passenger's doctor very carefully to see that all items have been accurately completed as any defective or

incomplete answers to the various items may result in the certificates not being recognized by the countries of transit and destination, and the passenger may, in consequence, be placed in quarantine. It is very important, for instance, to put in the 'origin and batch number' of vaccine used and in the case of smallpox vaccination to record the date and the result of inspection of vaccination in one of the terms prescribed at the bottom of the certificate. The prescribed forms also show the minimum and maximum validity periods of such certificates and passengers should ensure that their certificates are within the prescribed time limits.
 2. Considerable difficulty has been experienced recently by Indian passengers going abroad on account of their inoculation and vaccination certificates being

found defective by the countries of destination. It is therefore essential in the interest of the passengers themselves to see that they carry with them certificates on the prescribed forms which have been carefully completed by their doctors.

3. As regards certificates of inoculation against yellow fever, the medical profession and the public are hereby warned that on account of certain technical difficulties in the storage and administration of yellow fever vaccine, this vaccine is not available to the doctors or the public and the certificates cannot be issued in India by anyone except by the following 5 (five) Government centres of inoculation :—

- (1) Haffkine Institute, Bombay.
- (2) All-India Institute of Hygiene and Public Health, Calcutta.
- (3) King Institute of Preventive Medicine, Guindy, Madras.
- (4) Central Research Institute, Kasauli.
- (5) The Provincial Public Health Laboratory, New Delhi.

Vaccinations should be arranged, by appointment, with the nearest of these centres where internationally recognized certificates on the prescribed form will also be issued. The Government of India propose to take legal action against any unauthorized issue of yellow fever certificates. The medical profession are therefore warned not to issue yellow fever vaccination certificates under any circumstances whatsoever and to direct passengers requiring such certificates to one of the above-mentioned centres.

CERTIFICATE OF VACCINATION AGAINST SMALLPOX

THIS IS TO CERTIFY THAT..... (Age.....Sex.....) whose signature appears below has this day been vaccinated by me against smallpox.

Origin and batch number of vaccine.....
Official Stamp

Signature of Vaccinator.....

Official Position.....

Place.....Date.....

Signature of person vaccinated.

Home Address.

Important note.—In the case of primary vaccination the person vaccinated should be warned to report to a medical practitioner between the 8th and 14th day, in order that the result of the vaccination may be recorded on this certificate. In the case of re-vaccination the person should report within 48 hours for first inspection in order that any immune reaction which has developed may be recorded.

THIS IS TO CERTIFY THAT the above vaccination was inspected by me on the date(s) and with the result(s) shown hereunder :—

Date of Inspection.....Result.....

.....

.....

.....

Official Stamp

Signature of Doctor.....

Official Position.....

Place.....Date.....

Use one or other of the following terms in stating the result, viz, 'Reaction of immunity', 'Accelerated reaction (vaccinated)', 'Typical primary vaccinia'.

A certificate of 'No reaction' will not be accepted.

Signature of persons vaccinated.....

(This certificate is not valid for more than 3 years from the date of issue.)

Explanatory note regarding the interpretation of results of vaccination :—

(1) Reaction of immunity—A papule appears on the first day, does not develop into a vesicle and rapidly fades away.

(2) Accelerated reaction (vaccinoid)—A papule appears on the second day, a vesicle on the third day, pustule (if present) on the fourth day, scabbing starts on the fifth day and the scab is off by the eighth day.

(3) Typical primary vaccinia—A papule appears on the fourth day, becomes a vesicle on the fifth day and a pustule on the eighth day. Scabbing starts on the eleventh day, the scab is off between the sixteenth and twenty-first day.

CERTIFICATE OF INOCULATION AGAINST CHOLERA

THIS IS TO CERTIFY THAT..... (Age.....Sex.....) whose signature appears below was on the dates indicated inoculated against cholera.

MATERIAL INOCULATING OFFICER

Date

Origin Batch no. and type Signature Official title

.....
.....
.....

(Signature of person inoculated.)

Official Stamp of Inoculating Officer.

(Home Address).....Date....

(This certificate is not valid for more than 6 months from the date of issue.)

PRIZE OF THE INTERNATIONAL ASSOCIATION FOR PREVENTION OF BLINDNESS

An honorarium of 1,000 dollars to promote research work on ophthalmology is offered through the American Members of the Staff of the International Association for the Prevention of Blindness, the jury to consist of the Executive Committee together with the President and the Officers of the Association.

The award will be made in connection with the XVth Concilium Ophthalmologicum. Papers may be presented by any responsible research worker. The subject is to be *simple non-inflammatory glaucoma* and may include anything definitely relative to the question. The matter must be new and of such value, in the judgment of the jury, as to merit this recognition. Papers may be written in English or French; they should be those heretofore unpublished or those published between this date and 15th October, 1949. They should be in the hands of the Secretary of the International Association for the Prevention of Blindness, 66 Boulevard St. Michel, Paris, through whom they will reach the Members of the Judicial Committee, not later than 15th October, 1949.

The decision of the jury will be final.

MEDICAL STUDENTS TO WORK IN RURAL AREAS

(Abstracted from the editorial, *Medical Digest*, Vol. 15, No. 8, August 1947, p. 194)

THE senate of the Bombay University resolved at its recent meeting that with a view to acquainting the medical students with the problems and conditions of medical relief in rural areas, the Syndicate be requested to consider the desirability of requiring the medical students to work for a specific period, like six months, in rural areas as 'Interns'. An amendment that they should be asked to work as 'Interns' after passing the final examination and prior to receiving the degree was accepted. The mover of the resolution Dr. Mahajani said that he had already done some spadework with regard to the idea expressed in the resolution. A resolution moved by him in the Legislative Council had

been adopted and the Government had assured him of all the necessary facilities for the medical students to work in rural areas.

The idea behind the resolution, the supporters said, that the rural areas from where the poorer class of patients come to the big hospitals in large numbers will give the student a regular insight into social and preventive medicine which to-day is an absolute necessity. The Bombay Medical Council has also recently adopted a similar resolution.

NEED OF INTEGRATION OF PREVENTIVE AND CURATIVE MEASURES

(An abstract of the Convocation Address delivered by Dr. Jivraj N. Mehta, Secretary, Ministry of Health, and Director-General of Health Services, Government of India, at the College of Physicians and Surgeons, Bombay, on the 9th January, 1948)

'The objective of a national health programme should be to provide the individual with adequate curative and preventive medical facilities not in relation to his capacity to pay for such facilities but also in relation to the requirements of his physical and mental condition', observed Dr. Jivraj N. Mehta, Secretary, Ministry of Health and Director-General of Health Services, Government of India, in the course of his convocation address at the College of Physicians and Surgeons, Bombay, on 9th January.

He added: 'In establishing an efficient health organization, preventive and curative measures should be properly integrated and domiciliary and institutional services provided for the people should work in the closest possible co-operation. Our health programme should lay emphasis not only on disease and on methods of dealing with it, but it should also concern itself with the promotion of positive health'.

The implementation of the Bhore Committee's recommendations, Dr. Mehta said, would involve an expenditure of Rs. 1,000 crores in a period of 10 years. Though the financial resources of India at the present moment would not permit this expenditure for some time, we could not sit idly. The altered conditions demanded a reconsideration of the whole situation to enable the carrying out of necessary measures for medical relief and public health to meet conditions brought to the notice of the country in the Bhore Committee's report. Dr. Mehta, therefore, put forward a fourfold health programme which should make provision for (a) training of medical and ancillary personnel; (b) expansion of existing health services; (c) the promotion of medical research; and (d) education of the people to preserve their own health through the practice of personal and communal hygiene.

Training of personnel

Dealing with the training of medical and ancillary personnel, Dr. Mehta said that there was need for laying greater emphasis on the training of non-medical workers. These could, with adequate supervision by doctors, be made to perform a wide variety of curative and preventive duties in a well-organized health programme. Preventive inoculation, sterilization of water supplies, elimination of flies, mosquitoes and other insect pests were all measures which could be undertaken by persons with relatively small periods of training. This was all the more necessary because the cost of their training was relatively less than that required for medical education. With regard to medical education, it was desirable to raise the number of colleges, but the more urgent need was to raise the admissions to individual colleges, which could be done by providing a double shift of classes for laboratory subjects. For the clinical instruction of the additional students, Dr. Mehta suggested the idea of utilizing the existing hospitals in cities, where medical colleges exist, which were not so far utilized at present. Such an arrangement would facilitate quicker outturn of doctors per year at a relatively cheaper cost than by a further increase in the number of medical colleges in the country.

Expansion of health services

In attempting to expand the existing health services, Dr. Mehta observed, one of the steps necessary was the 'consolidating of the Medical and Public Health Departments in the provinces into a single organization so that the fullest possible measure of co-operation between the two branches of health administration may be secured. Without such co-operation it is not possible to develop reasonably good services in many fields, for example, maternity and child welfare work, control of infectious diseases, including tuberculosis and venereal diseases and supervision of health of school children'.

Dr. Mehta suggested for the consideration of the Provincial Governments that an organization be set up to carry expert medical advice to the remoter areas in a district which would be the unit of health administration. A mobile team consisting of a well-qualified physician, a surgeon, a gynaecologist, an obstetrician, an ophthalmologist, an aural surgeon and a clinical pathologist should be organized for service in two adjoining districts in the first instance, its range of jurisdiction being reduced later to a single district. This scheme will have the merit of bringing expert medical relief near the doors of the rural population which forms such an overwhelming part of the inhabitants of the country. Such a mobile team could visit selected centres in the districts where temporary hospitals, say tents provided for the purpose, could be housed, and these mobile hospitals could be shifted from centre to centre in the districts every few weeks, so as to bring specialized medical relief to remote village areas as far as possible.

'In view of acute shortage of steel and cement so essential for construction of permanent hospital structures, we should concentrate on constructing 30-bedded Primary Health Centres or small Dispensary Hospitals, about 2,500 of which would be needed for the whole country to meet the short-term programme recommended by the Bhore Committee, in different parts of the country, and such centres including the houses for the medical, nursing and other staff, should be constructed of sun-dried bricks rendered with mud plaster like the other village buildings in the north of the country; and in the other parts of the country such structures may mainly consist of balties, bamboos and chhattis with tiled or thatched roof. It is readily understandable that we cannot obtain a hygienic finish in such buildings, but where this is required as in the case of operation theatres and treatment rooms, burnt bricks may be utilized and stone pavement for flooring wherever stone may be easily available. Thus, if Primary Health Centres could be constructed out of local materials available in rural areas, and if the assistance of the village people is sought in constructing them, the cost of construction would be considerably reduced and the recommendations of the Bhore Committee for extended medical relief more speedily put into effect than is otherwise possible'. Such structures would last 10 to 15 years by which time Dr. Mehta hoped it might be possible to put the long-term programme of the Bhore Committee recommendations into effect.

Dr. Mehta expressed the opinion that the services of practitioners of indigenous systems of medicine could be utilized for a wide variety of functions, particularly in the preventive field, with adequate training given to them either as part of their curriculum or at a later stage before admission to public service.

Medical research

Dealing with the problem of medical research, Dr. Mehta proposed whether a small cess on drugs and medical appliances entering the country from abroad could not be imposed statutorily in order to provide an annual source of income for the Indian Research Fund Association, the premier organization for the promotion of medical research in the country. He also suggested that apart from the Central Government, Provinces should also contribute their share to the cause of medical research.

Health education

Health education, Dr. Mehta observed, was a subject of great importance. It could not, in his opinion, be divorced from general education, which included the training which the individual began to acquire at home from the early period of his life as well as the training he received at his school and in later life. The health education programme should be so extensive as to influence the individual through every stage of his life. Even so, infancy and childhood were the periods during which the individual's main habits were formed and the health education programme should concentrate on the teaching of the parents, particularly the mother, to impart proper training to their children as well as on the teachers who could influence materially the formation of habits in children at an impressionable age. He felt that health education could produce its most lasting effects if it were grafted on to general education both for children and adults.

SPEEDING UP THE TRAINING OF NURSES

TWO-YEAR COURSE PROPOSED

By RANDOLPH B. JONES

(Issued by British Information Services, Eastern House, Mansingh Road, New Delhi)

To speed up the training of nurses in Britain, a Working Party set up by the Ministry of Health has suggested a two-year course instead of the usual three-year training period. The article below, which outlines the salient features of the scheme, is of special interest to India where the shortage of trained nurses is acute and where plans have already been formulated for the setting up of a General Nursing Council to co-ordinate the activities of the provincial bodies and to prescribe a uniform standard for the profession.

In a report, which was described by Britain's Minister of Health, Mr. Aneurin Bevan, as the 'most stimulating and challenging document yet produced on nursing', a Working Party which had been set up by the Ministry in January 1946, has laid down a number of suggestions for a fundamental reform of the training of nurses in Britain.

As the main recommendations of the report are all long-term measures and ask for considerable changes of organization, the Ministry of Health will consider, of course, the views of the nursing profession before taking any final decisions on them. However, while these long-term reforms are being worked out, the Minister has already set up some plans for immediate action to make the best use of the existing nursing force in Britain.

Student status

One of the principal recommendations of the Working Party is to give all nurses in Britain the full status of students during the period of their training and to relieve them of all domestic duties in hospitals.

The report suggests that under these conditions the nurses' training course might be shortened from three to two years without lowering the standards of British nursing. During this period trainees could be systematically introduced to all spheres of their profession. The curriculum would not only embrace all sides of hospital nursing, but also public health service and the prevention of disease.

To give students the chance of practical experience in all aspects of their profession, it is recommended to form composite training units covering the entire range of nursing, such as hospitals, clinics and public health institutions. This would give them a chance of moving in turn from one aspect to another.

The new two years' course for nurses as set up in this report allows 18 months for the general basic part of the training. After passing a preliminary examination, students should then be able to take part in a six months' concentrated course in a specialized field. At the end of this time they would take their

final examination and be certified provisionally as 'State Registered Nurses'.

To conclude the period of their training the State Registered Nurses, however, would be compelled to have a year's practical experience under supervision before being allowed to practise their profession independently. That way the Working Party hopes to answer criticism that a two-years' course may be insufficient for thorough training. If any nurse should wish to change over into some other branch of her profession she would have to attend another six months' specialized course.

Selection methods

Further courses could be arranged in universities and schooling centres to allow selected nurses to prepare themselves for higher posts in hospitals. A more psychological approach to the selection of candidates for these posts is recommended.

During World War II the Service Departments had worked out a number of psychological selection methods for the forces which proved their worth so conclusively that they are adopted at present for selection in civilian occupations. If adapted and used for nurses they would permit an objective choice to be made among nurses before they begin their training. Such selection methods would also give a clear picture of the abilities of candidates for the higher posts such as ward sisters or matrons.

Close examination has shown that over half the student nurses (54 per cent) left the profession during their training. Many of them appeared unsuited to their work intellectually or temperamentally—they should never have been admitted to the courses. Many girls had chosen the profession out of an inspiration to succour suffering humanity. But instead of tending the sick or helping the oppressed, they found themselves given futile or subordinate tasks which should have been performed by the domestic rather than the nursing staff. Senior nurses should give more consideration to the temperament of their juniors.

The Working Party conclude that the wastage of nurses could be reduced to 15 per cent if modern methods of selection and training were adopted.

Reforms in hospitals

The report recommends a number of reforms in the hospitals such as the introduction of the three-shift system, increased leisure and regular holidays for nurses and improvement of material conditions in living quarters. Part-time nurses should be encouraged, so that married nurses, in spite of their domestic duties, could practise their profession. The increased use of male nurses would help to relieve the present shortage of staff. Candidates for training, who are below the required level of abilities for nurses but otherwise suitable, should be used as nursing orderlies.

A full implementation of all these recommendations would ask for a considerably stronger nursing force than is at present available; 112,000 instead of 88,000 nurses are needed to make the three-shift system and the reform of training possible. In future, once the National Health Service has come into being, Britain might need between 120,000 and 125,000 nurses. The present general labour shortage naturally restricts the recruitment of nurses. A further difficulty lies in finding an adequate number of teachers and instructors for the revised training system.

The Ministry of Health has asked hospital authorities to examine interim measures to reduce wastage, to build up their domestic staffs to relieve nurses of such duties and to make the maximum use of part-time and married nurses. In recent months 12,600 nursing staff have taken up part-time service. As a result, hospitals in different parts of Britain have been able to re-open wards. Three thousand European volunteer workers have increased the domestic staffs in the hospitals.

Such reforms can thus be introduced, but the more fundamental recommendations of the Working Party require an organization which can only be gradually set up.

Public Health Section

ROLE OF *PALKIES* (MOVING RELIGIOUS FAIRS) IN THE EPIDEMIOLOGY OF CHOLERA WITH SPECIAL REFERENCE TO SRI EKNATH MAHARAJ *PALKI*

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THE important part which religious fairs and festivals play in the spread of cholera has been discussed in all its aspects by the public health authorities from time to time. As a result of this, the preventive measures adopted among the pilgrims such as indirect form of compulsory anti-cholera inoculation by the prohibition of entry of uninoculated persons into festival areas and efficient sanitary arrangements at the festival centres themselves have reduced the incidence of cholera in the country to a large extent.

In this article it is intended to deal with and discuss a type of moving fair which is locally known as a *palki*, literally meaning a palanquin intended for carrying an idol or a deity or an important person in procession, but in this particular case used or intended for carrying the wooden sandals of some well-known saint to a central place of pilgrimage, such as Pandharpur in Bombay Presidency. These *palkies* start from a place which is either the birthplace of a saint or where his ashes lie buried. They sometimes travel a distance of more than three to four hundred miles before they reach Pandharpur and after attending the Ashadi fair there during the month of July, return to their place of origin.

These *palkies* serve also another useful purpose. Several poor pilgrims who are unable to finance a long journey to Pandharpur follow the *palki* on foot in easy stages, and are also fed on their way by the devotees of the saint. In olden days when a long journey was not free from risk to life and property, such travelling in a body (consisting of thousands of pilgrims) avoided this danger. On the other hand till recently these *palkies* were usually a source of cholera at Pandharpur or they were the means of carrying the infection from Pandharpur to hitherto uninfected villages along their return route. In spite of the greater facilities afforded by the railway and motor services, during the present times, many of the pilgrims still find this way of pilgrimage to Pandharpur by following a *palki* a great advantage.

During recent years public health authorities have become alive to this source of spread of cholera epidemics, and arrangements are made

along the routes for thorough disinfection of drinking water supplies and attention to other necessary sanitary measures. Now these measures, combined with compulsory inoculation of pilgrims, do help in preventing the spread of infection. For example, a *palki* had to start with a large number of pilgrims from a place which was already heavily infected with cholera and there was infection in some of villages along the route. Even among the pilgrims a few cases of cholera had taken place but an epidemic outbreak was prevented and none of the hitherto uninfected villages were affected as a result of the procession which covered a distance of more than 300 miles.

Origin of the *palki*

In the history of the Deccan the town of Patan (formerly known as Paithan), the headquarters of the taluka of the same name in the district of Aurangabad, has played a great part. It is mentioned in the old religious books of the Hindus and not a few of the Greek authors have referred to it in their works. However, the present-day importance of this town is due to the fact that it was the birthplace of the great Maratha saint, philosopher and poet, Eknath. Like his parents and grand-parents, Eknath was a great devotee of the presiding deity at Pandharpur. He used to visit the place almost annually. Eknath died in the year A.D. 1599 and his ashes were buried on the banks of the river Godavari on the outskirts of the town Patan.

Since his death it has become customary to take the *padukas* (wooden sandals) in a *palki* every year to Pandharpur during the Ashadi festival. The *palki* starts from Eknath Maharaja's temple at Patan and the tradition states that it takes the same route to Pandharpur as was taken by the saint himself when he was alive.

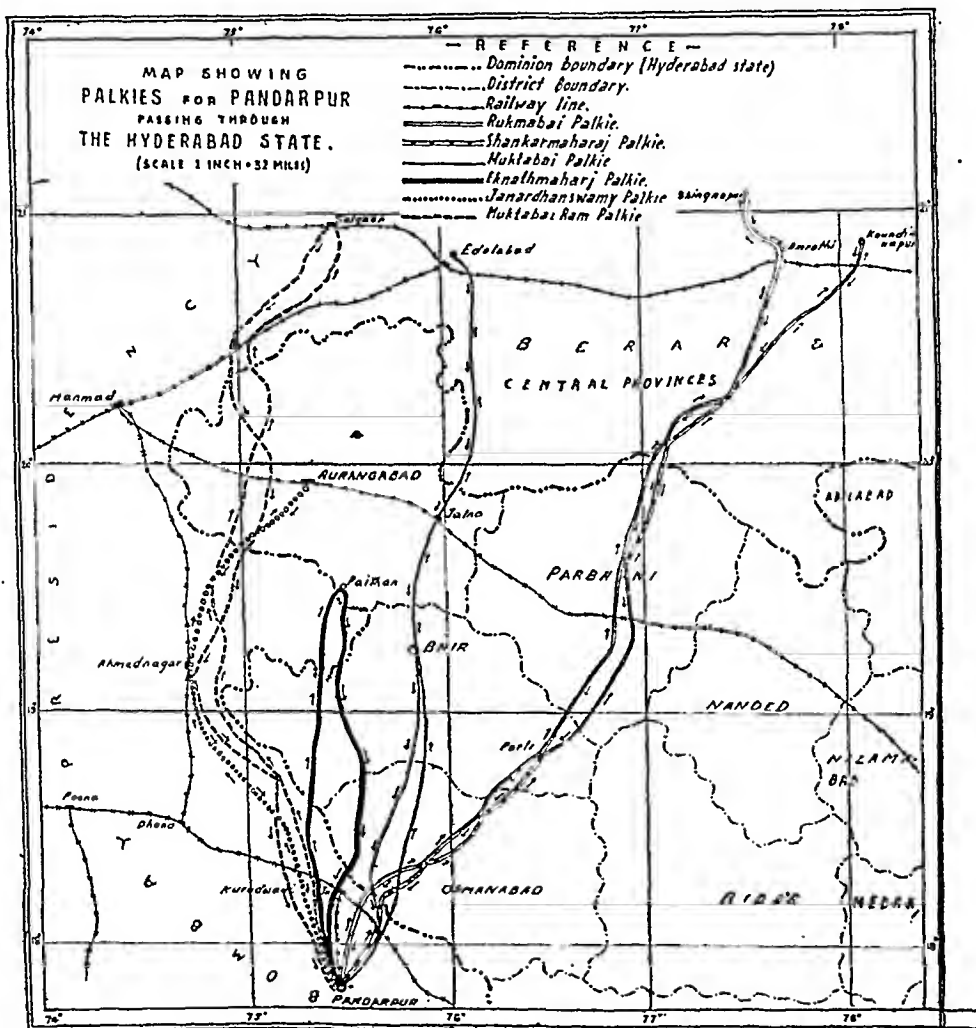
During the year under discussion, the *palki* left Patan on 16th June, 1941, and reached Parenda, the last halting place within H.E.H. the Nizam's Dominions on 28th, a distance of about 150 miles. A further six days' journey brought it to Pandharpur, about 55 miles from Parenda. On its return journey the *palki* left Pandharpur on 8th July and reached its first halting place within the Dominions on the 13th. With a greater speed on its return journey, crossing the river Godavari, it reached Patan on the evening of 20th.

The author was in charge of the medical and sanitary arrangements and followed the *palki* only within the limits of H.E.H. the Nizam's Dominions, in which the major part of both outward and return routes lay.

Medical help

Besides the treatment of cholera cases and the adoption of preventive measures at every halt within the Dominions (and not infrequently at other places when needed), a well-equipped dispensary was always at the disposal of the pilgrims for attention to all ailments. This proved not only very popular but helped to create confidence in the authorities whose advice, particularly with regard to health matters, was willingly followed by the pilgrims. But for this ready co-operation, cholera epidemic would

people who generally do not exceed 50 to 100 in number; get a little better quality of food. In most of the villages it is the custom to prepare bread in separate houses and then to collect them at a central place not far off from where the *palki* stops. All the pilgrims are collected at this place and fed. Where a sweet preparation is provided, it is generally prepared in one place, materials being collected from different houses previously. In a few towns on the way the individual villagers take a number of pilgrims to their houses and feed them. Wherever food



Map showing palkies for Pandarpur passing through the Hyderabad State (scale 1 inch=32 miles).

have most probably created a havoc among the pilgrims and spread to the villages on the route.

Feeding arrangements for the pilgrims en route

The usual custom is that all the pilgrims are fed by the residents of the village where the *palki* stops. As the places of halting are almost fixed, the villagers make arrangements in advance. Most of the pilgrims are usually given jawari or bajri, bread and dal, and where the villagers are more well-to-do, some sweet preparations are also supplied. Brahmins and other higher caste

was prepared in a general kitchen it was supervised and only fresh materials were allowed to be used and apparently healthy persons permitted to prepare them. All the wells in the villages were disinfected by the health inspectors 24 hours in advance besides the previous disinfection by the health staff of the district generally a week earlier. In places where cholera epidemic was feared or where cases were actually occurring, all suspected wells were kept out of bounds to the pilgrims and the water of other wells in the village once again disinfected. No pilgrims were allowed to drink water that was not previously permanganated or treated

with bleaching powder. Wherever possible, eating and drinking in infected villages was avoided entirely.

Cholera infection and the anti-cholera measures adopted

Patan town, from which this *palki* started on 16th June, was already in the grip of a cholera epidemic. From 23rd May, when the first cholera case was reported, up to the time of the author's arrival there (12th June) altogether 49 cases of cholera had occurred with 18 deaths. Cases had also been reported a few days earlier from the villages along the banks of the river upstream. With the help of the local officials, the teachers and students of the local school a watch was kept along the bank of the river to prevent washing of the clothes and at the same time to permanganate all the water that was taken from the river either for drinking or for other domestic purposes. Water along the edge of the river (one yard from the bank) was treated with bleaching powder twice a day for three days in succession, and the results were very encouraging. From the third day onwards no fresh case was reported. In the meantime special attention was paid to the pilgrims, who were pouring in numbers from the surrounding villages with the intention of accompanying the *palki* to Pandharpur on foot. All those who were not inoculated against cholera in one or other inoculating centres specially set up for this purpose, were inoculated. Pamphlets in Marathi, describing briefly the simple anti-cholera measures, were distributed freely. All the places particularly in H.E.H. the Nizam's Dominions, where the *palki* was scheduled to stop either for day meals or for night rest, were attended to by one or other members of the health staff of the district concerned, a week before by disinfecting all sources of drinking water supply. A health sub-inspector was always a day's journey ahead to attend again to the disinfection of the water supplies and to send information of any cholera infection present in the villages *en route*. However, these arrangements were not attended to on the second day for some reason or other at Mungi, a village in Ahmednagar district, on the south bank of the river Godavari. The first case of cholera among the pilgrims was detected at Kundal Pargaon, a place of night halt on the third day of the journey; immediately the health authorities of the district were informed of the incidence and the patient isolated and treated in a shed on the outskirts of the village. Early next morning before the starting of the *palki* on its onward march, all those pilgrims who had escaped inoculation at Patan or who had joined the procession on previous night from the surrounding villages were inoculated.

On the morning of the 20th June, information was received that Dahiwandi (population 125), a village in Bhir district which was on the route, was heavily infected with cholera (30

attacks and 14 deaths). First precaution adopted was that the *palki* was made to go through the outskirts of the villages instead of through it. All food and water distribution to the pilgrims from this village was stopped entirely.

The village Sirur (Ahmednagar district) was the next halt and here also similar measures were adopted by the local authorities.

On 22nd June, 1941, at Patoda, a boy was found to be suffering from cholera. He and the contacts (4 in number) were immediately isolated in a building outside the village but near the civil dispensary, and the medical officer of Patoda was requested to look after them; unfortunately the boy succumbed early next morning. Due to this incident, with the help of the local police and the medical officer, arrangements were made for establishing an inoculating centre outside Patoda village at a place through which the *palki* had to pass. Here the inoculation certificates of all pilgrims were carefully checked and all those who had joined the *palki* on the previous day in the intermediate villages and who were unprotected were given anti-cholera inoculation. By this time the number of the pilgrims was more than 1,500.

On the 23rd another case of cholera among the pilgrims along with 4 contacts was seen and isolated at Gumre-Pargaon. This patient recovered and so also another patient who was detected at Dighul, a British India village.

On the 25th the last case of cholera among the pilgrims was isolated at Deogaon, a village in Osmanabad district. The district health officer was immediately informed of this. From here to Parenda the journey was uneventful. On the morning of the 28th, on the eastern bank of the river Sina, in the presence of the Epidemic Officer of Ahmednagar, a careful scrutiny was made of the pilgrims and all those (only few in number, being the fresh arrivals) who were found without certificates were given anti-cholera inoculations. It was also assured that no cholera or contact case passed into the British territory and among the 1,697 pilgrims that accompanied the *palki* on that particular day. I was informed later by the Epidemic Officer of the Ahmednagar district that no case of cholera was reported among the pilgrims till it reached Pandharpur on 4th July.

On the return journey I met on 13th July at Karmala the pilgrims who were now nearly 1,100 in number. From here they entered the state limits at Halgaon. There was no cholera infection, but dysentery was rampant. All the patients were immediately brought under treatment and special attention was paid to the supervision of their feeding by trying to avoid chillies and hot spices in their food. To the more acute patients milk was provided with the help of the *palki* manager and some of the more charitably disposed villagers. Being previously informed that Southada village on the route was

heavily infected with cholera, I left the *palki* at Halgaon and proceeded straight to this place. Here 57 deaths had occurred during the preceding two or three weeks and at the time of my visit there were two patients with acute cholera symptoms. As the *palki* was programmed to visit the villages next morning at 9 a.m. and pilgrims to receive their morning meals in the village, I tried to persuade the Police Patel (the headman of the village) to avoid preparing food in the individual houses, but to collect the raw materials and to prepare it outside the village at some suitable place and feed the pilgrims there. The health staff promised to undertake the supervision of the preparation of food and the disinfection of all drinking water, so as to avoid all risks of infection. At the instigation of some ignorant leaders, the villagers insisted on preparing food for the use of the pilgrims in their own houses, many of which had still convalescents from the recent cholera epidemic. Under these circumstances the *palki* manager was successfully persuaded to halt outside the village instead of in it and all the pilgrims were persuaded not to partake any food at Southada. Having full confidence in the medical and sanitary arrangements made for them hitherto, they willingly walked to the next village on the route to have their food. In the evening there was halt at Dongarkini, a British India village, in which a suspected case of cholera had been found on the previous day. From here some of the pilgrims went to their respective villages in the neighbourhood, when only about 700 pilgrims were left in the procession.

On the 18th July, 1941, having obtained the information that a British India village, Antarvelli (quite near to the State border), was infected with cholera, I visited it and having really found it so, persuaded the *palki* manager to avoid this village altogether if possible. I believe the local authorities also desired the same and ultimately the procession passed through another village a mile away from the infected one. On the 19th by 5 p.m. it reached Patan with nearly 650 pilgrims, all in good health and, what is more, in cheerful spirits.

Total number of patients (new and old) treated was 821 (see table). Majority of these patients were from the pilgrims, while a few, particularly cholera cases, were also from the infected villages on the route. Both on the outward and return journey the largest number of cases treated were those due to disorders of the digestive system. Malarial attacks were of greater frequency during the return journey and so also dysentery. Cholera was of course more prevalent during the outward journey and entirely absent during the return journey. The two cases, shown in the table during the return journey, were belonged to one of the infected villages. The main predisposing cause for the greater prevalence of the diseases of respiratory and digestive system and specific infections such as dysentery and malaria was obviously the

lowered vitality caused by the long journey on foot and other hardships endured by the pilgrims en route.

TABLE

New and old patients treated during the *palki* tour of Sri Eknath Maharaj of Patan in the year 1941

Diseases treated	Number of patients treated during the outward journey	Number of patients treated during the return journey	Total
Cholera	54	2	56
Malaria	48	90	138
Mumps	1	4	5
Gonorrhoea	1	6	7
Influenza	4	7	11
Dysentery (amoebic-clinical) ..	9	36	45
Pneumonia .. ..	..	4	4
Pyrexia of unknown origin ..	..	3	3
Diarrhoea	6	8	14
Diseases of the digestive system ..	82	89	171
Diseases of the respiratory system ..	18	56	74
Diseases due to intestinal parasites ..	13	1	14
Diseases of the nervous system ..	6	3	9
Diseases of generative system ..	3	..	3
Diseases of urinary system ..	2	4	6
Diseases of heart	2	..	2
Diseases of skin	66	52	118
Syphilis	4	3	7
Diseases of liver	4	8	12
Diseases of the ear	6	5	11
Diseases of the eye	4	11	15
Rheumatism	8	4	12
Injuries	26	19	45
Simple inflammation	3	2	5
Abscesses	11	2	13
Ulcers	10	3	13
Other diseases	7	1	8
TOTAL	398	423	821

Discussion

Though the important part played in the epidemiology of cholera by the fairs and festivals with large congregations has been long recognized, yet if epidemics are to be prevented or controlled, it is well to remember that better sanitary arrangements themselves will not afford complete protection or prevent its spread to the neighbouring provinces and states. Pilgrims travelling long distances, particularly those following important *palkies*, such as the one described above, to and from centres of pilgrimage, too often form the means of transmission of infection along their route and under favourable circumstances become the source of

epidemic outbreaks in the districts through which they pass. The villages through which the pilgrims pass have little or no provision of good and protected water supply nor any conservancy arrangements. The lanes and bye-lanes of a village which has been the night halt of a *palki* and its accompanying pilgrims form a repulsive sight next morning on account of indiscriminate use of these places as temporary latrines by the pilgrims. Under these circumstances, no wonder that an infection among the pilgrims is soon likely to be the cause of severe cholera epidemics not only among themselves but also in the areas through which they pass.

For a long time anti-cholera inoculation was followed on a voluntary basis but in many places response from the public and particularly from the pilgrims was not encouraging. The deliberations of the Central Advisory Board of Health at its second meeting held in Madras in 1938 gave an impetus to this question and at present some provinces and states do adopt the indirect compulsory inoculation method with very encouraging results. In Pandharpur in Bombay Presidency and in several important fairs and festivals in Hyderabad State, this method is adopted and it is the experience of the public health authorities in these places that opposition to inoculation is gradually dying out, and cholera inoculation is taken by the general public almost as a routine procedure before going to a place of pilgrimage.

Sanitary arrangements at fairs and festivals generally are the responsibility of the municipalities or district boards concerned, but in any way it is one single administration that has to deal with such matters. The *palkies* under discussion have to pass through more than one administration, as several of these *palkies* have their origin in Central Provinces and Berar and pass through more than two or three districts in the Hyderabad State and then through the districts of Ahmednagar and Sholapur in Bombay Presidency. For good managements and efficient sanitary arrangements, a close co-operation between the public and the health administrations of the different provinces and states concerned is necessary. Such an arrangement exists at least between Hyderabad and Bombay Presidency, and information of any cholera infection is immediately telegraphed to the Directors of Public Health of both Governments as well as to the district health officers of the districts through which the infected *palki* has to pass.

Whenever cholera breaks out in a pilgrimage procession, which is moving on foot at a fast speed and has a long distance to travel, the management of a cholera case becomes a difficult problem. This is particularly so when the route does not lie along the railway or roads but along cart-tracks. The patient, if left behind, will be without proper medical aid and it is also not possible to carry the patients and their contacts along with this large procession without risk to the others. It is always advisable to have one

or two bullock carts to serve as improvised ambulances, so that the patients and their contacts can be immediately isolated and sent to the nearest hospital or dispensary to be properly attended to.

There is no doubt that in this particular *palki*, which started from a place which was having a severe cholera epidemic and with few infected villages along the route, it is this protection of the pilgrims by mass anti-cholera inoculation that prevented a severe outbreak among the pilgrims themselves and also prevented the infection from spreading to hitherto uninfected villages that were on the route and which formed the places of day and night halts for a large number of pilgrims.

Summary and conclusion

1. A type of moving religious fair (*palki*) has been described. These processions passing to and from important places of pilgrimage have been the cause of spread of cholera in the past.

2. These *palkies* travel a long distance, sometimes more than 300 miles and pass through different administrations, making their management particularly very difficult when there is an epidemic of cholera outbreak, unless very close co-operation exists between the public health departments of the different administrations.

3. Sri Eknath Maharaj *palki* in the year 1941 started from Patan, a town heavily infected with cholera, and its route lay through the area in which some villages were already affected.

4. As a result of adoption of compulsory (indirect) inoculation against cholera among the pilgrims, this *palki* did not witness any severe outbreak of cholera among its own followers nor was any of the hitherto uninfected villages on the route affected as a result of the procession.

5. Suggestions have been made to select with care villages that serve as night halts and also for the provision of bullock carts which can be improvised as ambulances to shift the cases to the nearest dispensary or hospital where they can be attended to.

In conclusion, I have to mention that without the active co-operation and help of the district health officers of Aurangabad, Bhair and Osmanabad districts and their staff, it would not have been possible for me to manage the cholera infection successfully.

A PLEA FOR WATER POLLUTION RESEARCH

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A LARGE proportion of the population in India still do not have an adequate supply of safe water and mortality due to water-borne epidemics is high. While other countries in the world have expert committees and centralized

research laboratories to administer their needs in regard to providing safe water and abatement of water pollution, we have not even made a beginning in this direction.

India is now on the threshold of a new era and many plans are afoot for her future scientific development. The Board of Scientific and Industrial Research is to expand its activities on a grand scale and many National Research Laboratories are being established. The Bhore Committee has made a very comprehensive plan to take care of the health of the nation. These plans, however, do not envisage immediate creation of any centre for research on water, sewage, industrial wastes and stream pollution. Establishment of Central and Provincial Water Boards have been considered in the Bhore plan but sufficient emphasis has not been placed on research as the mainstay of the Board's activities. There is no nucleus of water pollution research at the centre now. The facilities available in the small number of provincial and state public health laboratories are indeed meagre both in regard to men and equipment and hardly adequate to cope with routine work. Modern trends in public health engineering are unknown in the existing engineering colleges in India and they have very limited facilities for conducting investigations in this field.

Let us examine the status of water pollution research in other countries. Water pollution research is primarily the function of the Federal and State Health Services in the United States of America where most of the recent developments in this field have taken place. In England, it is part of the activities of the Council of Scientific and Industrial Research. Judging from the results achieved the developments in U.S.A. have been more fruitful both in regard to the advancement of knowledge in this field and providing better sanitation.

As early as 1913, an Act of the Congress empowered the United States Public Health Service to extend its activities to investigations of stream pollution and other allied sanitation problems. In July the same year the Service opened a laboratory at Cincinnati (Ohio), which was devoted exclusively to the study of streams used for water supplies in regard to pollution by wastes and their natural and artificial purification. A well-balanced team of experts in Sanitary Engineering, Chemistry, Bacteriology and Biology was stationed in this laboratory. During the last 30 years a large volume of very useful work has been carried out at this station. Apart from solving the immediate problems on hand a great deal of fundamental work on problems of self-purification of streams and lakes, sewage oxidation and water treatment have also been carried out; general laws have been formulated in regard to natural purification under various conditions of pollution load, stream flow and temperature. A variety of sanitation problems have been investigated with most fruitful results and it is hardly possible to

review them here. Suffice it to say, the publications from Cincinnati Laboratory have ranked very high in the world's literature on the subject and many of them are used in the teaching of Public Health Engineering all over the world. Reviewing twenty-five years' activities of the Cincinnati Laboratory the Medical Director of the United States Public Health Service says in 1938 that 'the activities of this laboratory have constituted one of the best investments of not only the Public Health Service but of the Nation'.

Among the State Health Laboratories of America, that have made significant contribution, mention may be made of the Lawrence Experiment Station. This was established as early as 1887 by the Massachusetts State Board of Health in order to carry out an act of the legislature to protect the purity of inland waters. One section of this act authorized the Board 'to conduct experiments, to determine the best practicable methods of purification of drainage and sewage or disposal of the same and to employ such expert assistance as was necessary'. The contributions made by the Lawrence Experiment Station have laid the foundations of some aspects of modern sanitary engineering. Allen Hazen's fundamental investigations on filtration and Sedgwick's work on water microscopy were carried out from this station. Experiments carried out at Lawrence as early as 1912 formed the basis for what is now known as the activated sludge process of sewage treatment. Apart from these, much useful work on trickling filters and treatment of trade wastes have also been carried out in recent years. The achievements of Lawrence and Cincinnati gave the necessary incentive for a nation-wide development in water pollution research in America and to-day every one of the State Health Departments has a team of experts and well-equipped laboratories to investigate their water, sewage and trade waste disposal problems.

In the early days, County and Municipal Drainage Board and their laboratories carried out much useful work on water pollution problems in England. The Royal Commission on Sewage Disposal and more recently the River Boards have made very notable contributions—some of their data and findings are even to-day considered classic in this field of studies. It was not until 1927 that the Water Pollution Research Board was established in England. Its terms of reference were as follows: 'To report to the Privy Council for Scientific and Industrial Research from time to time, schemes for research on pollution of rivers and other sources of water supply by industrial effluents and sewage and on any relevant matters affecting purity of inland waters and to supervise execution of approved investigations'. Simultaneously with the formation of Board an organization for research was also set up as part of the activities of Department of Scientific and Industrial Research. During the last two decades the Board has carried

out many useful investigations on treatment of water; sewage and trade wastes, effects of pollution of surface waters and allied problems. During the last war, when there were great changes in the industries of the country, the Board has tackled successfully in their laboratory many serious problems of pollution of surface water by industrial wastes.

America is more advanced than England in the application of newer knowledge to water treatment, sewage purification and abatement of pollution. English practices have lagged behind theory and old-fashioned treatment plants operated on empirical basis are not uncommon in England to-day. One of the factors responsible for this state of affairs is that organized research was encouraged in America much earlier and on a bigger scale than in England. Water pollution research was linked on to health of the State in America and the Federal and State Health Services were made responsible for it. But, in England, it was left to the encouragement of small municipal and county bodies and to the Council of Scientific and Industrial Research. Industrial research thinks in terms of benefits to industry and the public health viewpoints are therefore of secondary importance to them. More recently, however, there has been a tendency in England too to bring these activities under the administrative control of the Ministry of Health.

Water pollution problems in India are somewhat unique. When people congregate in large numbers in places of pilgrimage for purificatory baths, the water in these localities is grossly polluted and the same water is also devoutly swallowed by everyone. Commission of nuisance in public thoroughfares, village roads and tank bunds is common in many parts of rural India and all these filth find access to the neighbouring tanks and streams which are also used as sources of drinking water. With the impetus for industrialization in the New India many new industries will come into existence very soon. The disposal of industrial wastes, which hitherto was not of much consequence, will have, now, to be studied with due consideration to proper utilization of our waterways.

No work has been carried out in India on the foregoing aspects of water pollution. American and English experiences may not be directly applicable to Indian conditions without actual data. How the natural purification process will operate under conditions of high water temperatures, bulkier Indian sewage and industrial wastes, it will be hard to figure out without actual investigation. Basic data on these and allied problems is a necessary prerequisite for any scientific planning for the protection and proper utilization of our water sources. Anticipatory control measures are often necessary in handling water pollution problems and research in this field cannot await other developments. It is time that a nucleus for water pollution

research is set up at the centre and along lines suggested by the Bhore Committee.

I wish to thank Professor K. Subrahmanyam for his valuable criticism in the preparation of this article.

SCRUB TYPHUS (TSUTSUGAMUSHI DISEASE) IN BOMBAY

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THE occurrence of scrub typhus (Syn.: rural typhus, tsutsugamushi disease) in Bombay is of more than ordinary interest. In the literature all the cases hitherto recorded, in areas principally outside India, had been from clearing areas bordering on the jungle, plantations of sugar, of cocoanut and of oil-palm, open grassy terrain, camping sites, on banks of inundated rivers—in general exclusively from rural as opposed to urban areas, where the cases of typhus, when they occur, are OX19 in type. In the present series, the diagnoses were made in the first instance during the course of routine examination of sera from pyrexial cases for evidence of typhus infection. A review of the clinical course of the disease confirmed the serological diagnosis. The presence of the dermal lesion—the eschar—characteristic of tsutsugamushi disease, noted in two out of the five cases, and the isolation of one strain in the mouse and demonstration of *Rickettsia tsutsugamushi*, and cross-immunity tests with known strains, proved beyond all possible doubt the nature of infection.

The criterion of a positive serological diagnosis was a minimum agglutinating titre of 1/250 against a suspension of OXK killed by alcohol. Eight cases were found in six months between June to December 1945. Three of the eight were residents of the Bombay suburbs; the rest had been permanent residents of Bombay, who had, for a period of not less than four weeks, never been outside city limits. Short notes on four of the latter five, whose case records were available, are given below:—

Case 1.—A boy, aged 9 years, was admitted to the B. J. Wadia Hospital for Children for continuous fever of five days' duration. The parents gave a history of a pimple on the right axillary fold, four days before the onset of fever. A painful glandular enlargement in the axilla was noted two days after the appearance of the 'pimple' but two days before the onset of pyrexia. On admission, this pimple, which had

PLATE XXX

HISTOPATHOLOGICAL CHANGES IN LIVER IN CONGESTIVE HEART FAILURE (STUDY BY
NEEDLE BIOPSY) : P. N. WAHI & K. S. MATHUR. (G. A.) PAGE 715

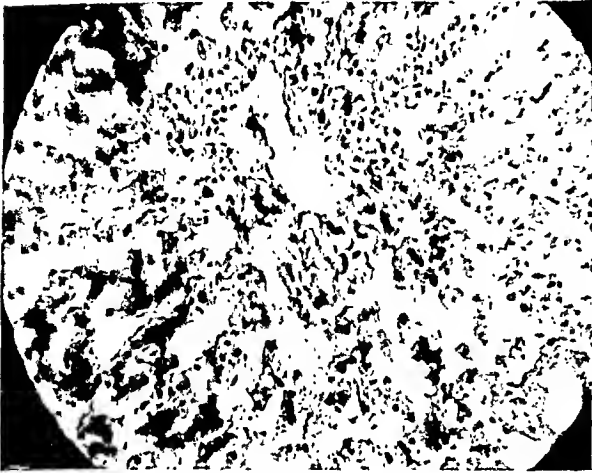


Fig. 1.

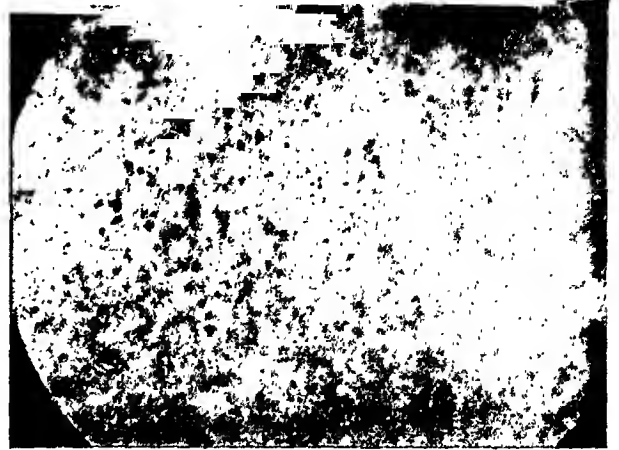


Fig. 2.

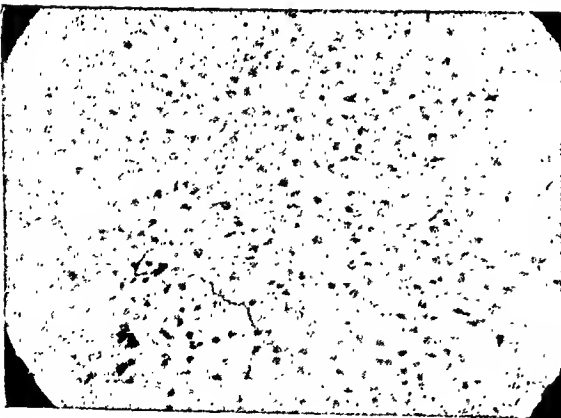


Fig. 3.

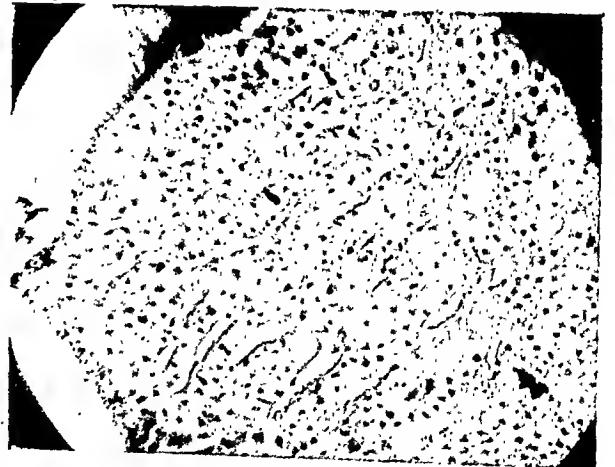


Fig. 4.

PLATE XXXI

HISTOPATHOLOGICAL CHANGES IN LIVER IN CONGESTIVE HEART FAILURE (STUDY BY
NEEDLE BIOPSY) : P. N. WAHI & K. S. MATHUR. (O. A.) PAGE 715

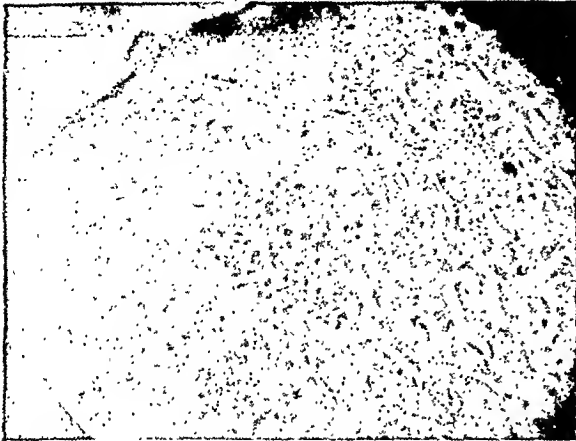


Fig. 5.

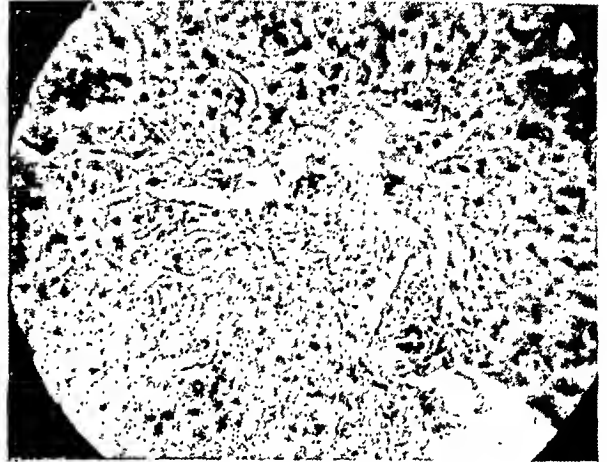


Fig. 8.

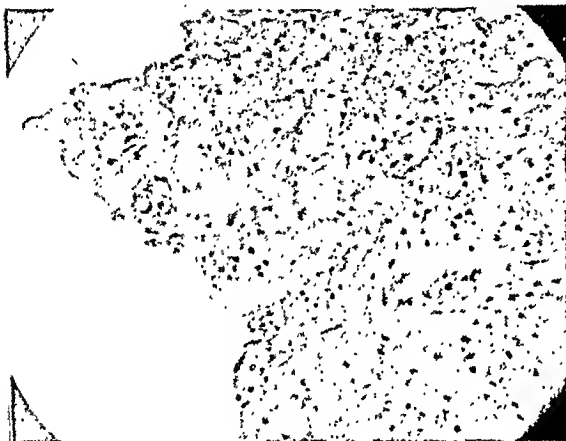


Fig. 6.

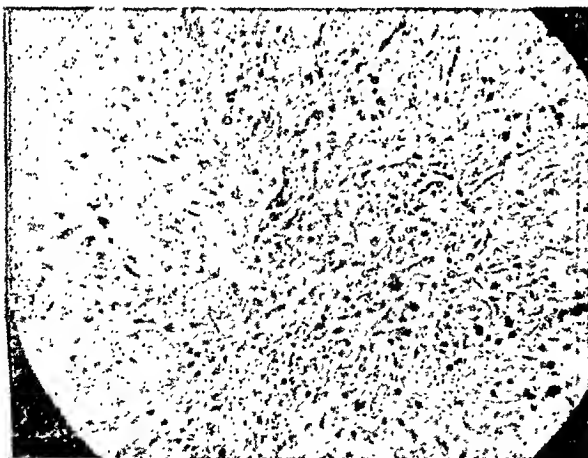


Fig. 7.

SCRUB TYPHUS (TSUTSUGAMUSHI DISEASE)
IN BOMBAY : S. R. SAVOOR, P. DÁS MENON
& S. M. MERCHANT. (P. H. S.) PAGE 753



Photograph of the ulcer on the left axillary fold,
case 3. The hyperæmic areola surrounding the
ulcer can be easily seen.

ulcerated meanwhile, had all but healed. The tonsils were enlarged and the pharynx congested; there was injection of the conjunctival vessels. The tongue was clear; liver (+) and spleen (++) enlarged. The respiratory and nervous systems were normal. The fever was of the remittent type, ranging between 100°F. and 102°F. On the 17th day, the fever touched normal and became intermittent, ranging between 98.4°F. and 101°F., and finally settled down on the 23rd day.

A maculo-papular rash was noted on the trunk on the 9th day of fever and lasted for one day only.

The leucocyte count of 11,200 on the 8th day fell to 6,100 on the 14th day. The differential count did not show any abnormality. Urine showed a trace of albumin.

The Widal reaction being thrice negative, the blood was submitted for the Weil-Felix reaction. The titre for *Proteus* OXK was 1/2,500 on the 14th day, which later rose to 1/5,000. Treatment was symptomatic.

Animal inoculations.—Four mice were inoculated intraperitoneally with a ground suspension of the blood clot which was thrice washed in saline. Infection resulted in two of them, which were therefore killed on the 19th and 21st day of inoculation. Post mortem revealed (i) approximately 1 c.c. of peritoneal exudate, thick and ropy in character; (ii) an enlarged spleen about five times the normal size; (iii) greyish-white exudate on the surface of the spleen. Smears prepared from the scrapings of the peritoneal surface, stained by the Leishman-Giemsa method, revealed intracellular organisms.

Stained by the Giemsa's method the organisms appeared as short rod-shaped bipolar-staining bacilli. With optimum differentiation they were seen to consist of two polar granules that stained purple and were connected by a pale blue rod. Their most characteristic grouping was that of one or more clusters that lay in greatest concentration close to the nucleus; but occasionally they lay scattered beyond the ruptured cell margin, as though prolific multiplication within the cytoplasm had caused rupture of the cell. Average limits of dimensions may be stated as 0.8 to 2.0 μ in length and 0.3 to 0.5 μ in width. Some variation in length and width was seen, but essential structure was constant. They appeared to be identical with the *Rickettsia orientalis* (*R. tsutsugamushi*) described by Nagayo *et al.* (1931) and Lewthwaite and Savor (1936a) and regarded by them as the causal organism of the tsutsugamushi disease (scrub typhus).

Laboratory investigations of this 'Naigaum' strain.

Six rabbits were inoculated intraocularly with 0.1 c.c. of a 1/10 dilution of the peritoneal exudate. Iridocyclitis resulted in the inoculated eye of each rabbit, the evolution of signs did not

differ from those observed with Malayan strains of tsutsugamushi similarly inoculated. Six weeks later, these rabbits were re-inoculated (in the unused eye), two with the 'Ceylon' strain and two with the 'Imphal 8' strains of scrub typhus. The rabbits did not react. Conversely, rabbits convalescent after infection with the 'Ceylon' and 'Imphal 8' strains were immune to the 'Naigaum' strain. Thus the 'Naigaum' strain was immunologically identical with the 'Imphal 8' and 'Ceylon' strains.

Case 2.—A girl, aged 8 years, was admitted into the B. J. Hospital for Children for continuous fever and cough alleged to have been of 15 days' duration. On admission, the conjunctival vessels were seen to be injected. The tonsils were enlarged and there was a slight bronchial catarrh. The alimentary, the nervous and cardiovascular systems were normal. The leucocyte count was normal. There was no enlargement of spleen. Fever was of the intermittent type, ranging between 98.4°F. and 104°F. It came down by lysis on the 25th day. There was neither rash nor complications. None of the glands was enlarged. The Weil-Felix reaction was 1/1,250 OXK on the 18th day and 1/2,500 on the 21st day. Treatment was symptomatic. Animal inoculations were carried out as in the first case, but of necessity as late as the 19th day; a strain was not isolated.

Case 3.—A male, aged 28 years, a cook by profession, was admitted to the G. T. Hospital for headache and continuous fever of seven days' duration. He complained of pain on the left side of the chest and sleeplessness. He gave a history of a 'pimple' on the left anterior axillary fold and painful glandular enlargement four days before he developed the temperature. On admission, a punched-out ulcer was seen, about 3 mm. in diameter, surrounded by a red areola 1 cm. wide (see figure, plate XXXI).

The glands in the left axilla were enlarged, discrete and tender. There was an impaired note on the left base, with poor air entry and fine crepitations. Liver and spleen were not enlarged. The nervous and cardiovascular systems were normal. There was no rash. Fever was remittent in type and lasted for 12 days. There was a secondary rise for two days. Convalescence was rapid.

The ulcer persisted till late in convalescence. The enlargement and tenderness of the lymph glands disappeared with pyrexia. The Weil-Felix reaction was 1/5,000 OXK on the 11th day of fever. Isolation of a strain was not attempted.

Case 4.—A boy, aged 15 years, was admitted to the G. T. Hospital for fever and cough of three days' duration. The patient was dull and appeared to be slightly deaf. The conjunctival vessels were injected. The tongue was dry. Respiratory, cardiovascular and nervous systems were normal. There was marked leucopenia.

The fever was of the remittent type and came down with lysis. The deafness was persistent till convalescence, which was protracted. The Weil-Felix reaction was 1/500 OXK on the 10th day, which rose to 1/1,250 on the 14th day. There was no rash and no ulcer. Attempted isolation of a strain on the 11th day did not succeed.

Commentary

The object of this paper is not so much to give the full clinical account of the four cases of scrub typhus as to prove that cases of scrub typhus can occur within the limits of a metropolitan area. The significance of this observation will be appreciated from the epidemiological remarks given below. Accordingly, only brief case histories are given, and much stress is laid on the isolation of a strain of scrub typhus and its immunological relation to two known strains of scrub typhus.

The studies of Lewthwaite and Savor (1936a, 1936b and 1940) and Lewthwaite *et al.* (1936) on the serology, immunology and epidemiology of scrub typhus and tsutsugamushi disease, once thought to be of separate entities, had shown that though the latter, unlike the former, shows presence of an eschar, the two diseases are identical. Clinical and epidemiological work since carried out by others have confirmed their observations. Two of the four cases (cases 1 and 3) showed an eschar.

Other diagnostic features are pyrexia, rash, lymphadenitis and the Weil-Felix reaction. The rash is not always a constant feature. The lymphadenitis is generalized in scrub typhus in approximately 80 per cent of cases. Such of the cases of scrub typhus which have a dermal lesion, show, in addition, a localized lymphadenitis, often tender, distal to the ulcer. Two of the four cases had lymphadenitis.

In regard to the Weil-Felix reaction, Robinson (1942) had reported that sera from approximately 98 per cent of cases of relapsing fever agglutinated *Proteus* OXK. Savor and Lewthwaite (1941) had shown that in the rabbit, experimental rat-bite fever also gave rise to a Weil-Felix reaction with *Proteus* OXK in high titres. In a personal communication to one of us (S. R. S.), Das Gupta reported that he had obtained this finding in rat-bite fever in man. However, the clinical course of relapsing fever or of rat-bite fever in man is different from that of scrub typhus.

Attempts were made to isolate strains from three out of the four cases; one strain was isolated. Intraperitoneal inoculation of this strain killed the mouse. The post-mortem findings were like those seen in the experimental scrub typhus in the mouse. *R. tsutsugamushi* were demonstrated in the endothelial cells of the peritoneum. Intraocular inoculation of the strain in the rabbit produced an iridocyclitis.

R. tsutsugamushi were demonstrated in the endothelial cells lining the Descemet's membrane. Tests carried out in the rabbit showed a reciprocal cross-immunity with the 'Ceylon' and 'Imphal 8' strains.

All the four patients were residents of Bombay. They came from different parts of the city. Two came from Naigaum, one from Colaba, and the fourth from the Nullbazaar area. They gave a categorical assurance that for a period of one month, prior to the onset of illness, they had never been outside the city limits.

Remarks on epidemiology

How may the known epidemiological data be consistent with the occurrence in a metropolitan area of scrub typhus which has hitherto been considered a disease exclusively of the countryside?

Epidemiological and field observations carried out in Japan, Malaya and Indonesia where the disease had been studied over a period of many years have revealed the following data: (i) The virus of tsutsugamushi had been recovered from many wild rodents: *Microtus monotebelli* in Japan, *Rattus rattus diardii* and *jalorensis* in Malaya and Sumatra. (ii) Certain jungle crows, such as *Centropus javanicus*, known to harbour *Trombicula deliensis*, have been incriminated in the spread of the disease. (iii) The larval forms of a few species of *Trombicula* are the vectors concerned in the transmission of the disease.

The rodent is presumably the reservoir, but its principal rôle may be no more than spreading scrub typhus from an endemic to a non-endemic area. Rats being of migratory habits and liable to transportation from place to place along with food and other commodities, an infected animal may be seen in an area where the disease is not endemic. But in the absence of the vector an infected reservoir is of little danger to man.

Can mites partially fed on an infected animal attack man? In their attempts to transmit scrub typhus by means of bites of larval mites found feeding on wild rats, Lewthwaite and Savor observed that when partially fed mites were interrupted in their feed by gentle mechanical detachment, they refused to 'take' on other animals. In a personal communication Mehta informed one of us (S. R. S.) that he too likewise failed to obtain re-feeding of partially fed mites. To test whether or not there is a tendency for the larval mite to transfer from one host to another consequent on the death of the animal on which it is feeding on at the moment and which may normally be assumed to occur in nature, Kohls *et al.* (1945) 'placed undisturbed colonies of mites from freshly dead rats on dampened soil in battery jars and mite-free rats of the same species confined in the jars and observed daily for a period of 3 days. In no instance were re-attachments observed'. If the tendency of these larval mites, as in the laboratory experiments, is not to transfer from one natural host to

another, it would appear that fully or partially fed mites are of little danger to man.*

It is the unfed but infected vector that is a source of real danger. The nymph and adult forms of *Trombiculae* are vegetable feeders. In their larval stage they attack animals, birds and men. In so much as the virus of tsutsugamushi passes through the egg to the next generation of mites, its infection or its transmission to animal or man takes place only during the larval stage.

The unfed and infected vector can exist only in areas where the ecological conditions are favourable to the development of mites. It may well be that if there are 'mechanical' means of transportation that keeps the unfed larval mites in a starved condition until it gets a host far from its breeding place, it is possible to get sporadic cases of scrub typhus in areas where the environmental conditions are not favourable to mite breeding.

The danger of scrub-typhus infection is therefore in the countryside, in the open grassy terrain, in rural areas amidst coarse vegetation and shrubbery. The name of flood fever in Japan, scrub typhus in Malaya (Fletcher and Lesslar, 1925) and scrub fever (Smithson, 1910), used synonymously with tsutsugamushi, are appropriate in that they indicate very broadly the source or danger zones of infection. Hitherto cases of scrub typhus have never been reported from cities. So much emphasis has been laid on environmental factors that one never expected the disease to occur in city areas. Only familiarity with the disease such few city physicians would have, would lead to its identification. One of us (S. R. S.), who has been studying this disease for several years, did not expect the disease to occur in Bombay. Hence occurrence of cases of scrub typhus in Bombay are of more than ordinary interest to the epidemiologist. Attempts were therefore made to trace the possible source of the infection in the above cases.

Bombay is like any other modern city. The only open spaces that exist are the public parks and playing fields, gardens to residential houses, and vacant building plots. These, though not numerous, exist throughout the various districts of the city where the patients came from. The parks, playing fields, and private gardens to residential houses are all well looked after. It is unlikely that these areas are favourable for mite breeding. Recent field work done under the auspices of the American Typhus Commission in the New Guinea area by Kohls and others suggest that 'well cleared camp sites offer unfavourable environmental conditions for trombiculid mites, and under such conditions

the chances of such mites surviving until opportunity for attacking man is presented are remote'.

Hence, by a process of elimination it would appear that scattered plots of undeveloped land and vacant building sites are sources favourable to the development of mites. These localized empty spaces are uneared for throughout the year. In the hot season, which extends from March till the middle of June, the land is parched with little vegetation in these areas. But after the monsoon rains there is dense growth of native vegetation and of grass. It is during such periods that any semblance of shrubbery is seen. It may well be that during the monsoon and the three or four months following it, these areas form foci of breeding ground of mites. It is well known that during the dry weather larval mites burrow into the soil and come to the surface after rains. From this it would appear that in Bombay, scrub typhus is of seasonal occurrence, as indeed in our cases, extending from the onset of the monsoon in June till about the end of the year. This point will have to be investigated hereafter.* The rainfall in Malaya throughout the year may well be the cause of the distribution of the incidence of the disease throughout the twelve months (Lewthwaite, 1930).

It may be objected that people seldom wander into empty plots of undeveloped land. Three of the four cases were boys. When the monsoon season ceases, in September, and the south-westerly breeze is favourable, kite-flying is a favourite pastime in Bombay. All the three boys admit to having flown kites, though they do not recall having gone into vacant building plots, etc. It is suggested, however, that attempts to retrieve kites or some similar misadventure tempted these boys into the thick vegetation of building sites and of undeveloped land, and exposed them to the attack of mites.

The fourth patient was a cook. He denied ever having gone for months beyond the entirely urban Colaba district of the city, or into the parks, playing fields, or to the shrub areas referred to above. If we postulate that passive mechanical transportation of unfed larval mites is feasible, is it unlikely that the patient may have got the mites on his body at the time of handling vegetables? It may be of fortuitous occurrence, but the eschar on the left axillary fold of the cook is suggestive. According to Gordon (1940), 'persons who handle vegetables, grain, hay and other products, are most endangered'. The vegetables which are marketed in Bombay are grown in the suburbs and in areas well beyond. The authors have

* However, in a recent personal communication, one of us (S. R. S.) was informed that at the Medical Research Council Scrub Typhus Laboratory at Imphal, Assam, it was observed that mites which were detached arbitrarily after a few hours of commencing to feed did re-attach to another test.

* Since writing the above, D. W. Soman, in charge of the Typhus Enquiry at Bombay, recognized 17 cases of scrub typhus during the months of September, October and November 1946, and isolated 7 strains. 'N-serologically positive sample was obtained in any other period during the year'—D. W. Soman (1946).

seen cases of scrub typhus, other than those reported, residing in Bombay suburbs, viz, Bandra, Santa-Cruz, Kalyan, etc. One of us (S. R. S.) has isolated a strain of tsutsugamushi from a patient coming from the Bandra area, which showed a reciprocal cross-immunity with the 'Naigaum' strain isolated in Bombay.

These four cases of scrub typhus indicate that even a metropolitan area such as Bombay is not free from tsutsugamushi disease. We feel almost certain that it is present in the suburbs of the large cities of India, such as Calcutta, Madras, Lahore, etc. Indeed from Alipore, one of the suburbs of Calcutta, Savor and Major M. T. Parker, R.A.M.C., isolated a strain—the 'Calcutta' strain of scrub typhus. In an agricultural country like India, it is to be feared that the importance of scrub typhus has not been properly appreciated. When the data collected by the military personnel during the course of the troop movements in India, Burma and Ceylon regarding the prevalence of scrub typhus becomes available, more will be known about the extent and distribution of the disease, and the parts it plays in the rural economy of India.

The Superintendents of the G. T. Hospital and the B. J. Wadia Hospital for Children are thanked for permission to report on the cases. The photograph was taken by Messrs. R. D. Nayak and R. S. Sawardekar, artists to the Seth G. S. Medical College, Parel, Bombay.

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The Indian Medical Gazette Fifty Years Ago

ELEPHANTIASIS

(Reprinted from the *Indian Medical Gazette*, Vol. 32, December 1897, p. 463)

FIFTEEN years or more have elapsed since Manson first demonstrated the causal relationship between elephantiasis and other forms of filarial disease. Since that period experience has so amply confirmed these observations, that it is somewhat startling to find any revival of scepticism regarding this important matter. The fact that such scepticism does exist makes it worth while to draw attention to the subject, and to recapitulate some of the facts, which seem to prove that elephantiasis arises from causes similar to those which produce lymph-scrotum, lymphangiectasis, chyluria, and other forms of filarial disease.

In the first place, there is the well-known fact that these diseases coincide in their geographical distribution. Extremely interesting in this connection is the following fact:—

In a certain limited area of a large town, cases of elephantiasis of the legs are so numerous that persons suffering from the disease may be seen, almost at any moment of the day, walking in the streets. In the heart of the district there is a hospital in which cases either of elephantiasis or other forms of filarial disease may almost always be seen. It is, however, not only in the same district that we find these diseases co-existing but in the same houses. There is, therefore, some factor in the conditions under which certain persons reside that renders them liable to suffer either from elephantiasis or one of the other forms of filarial disease.

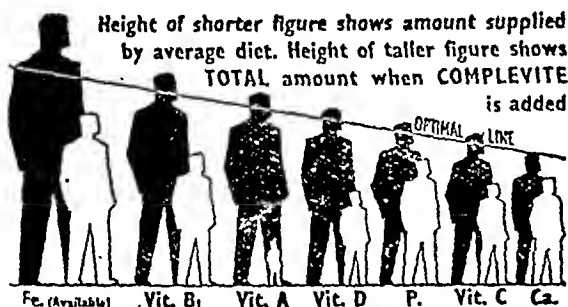
Still more striking is the fact that these diseases are not infrequently found to attack the same individual simultaneously. An interesting case of this nature was recorded by Manson, in which elephantiasis of the leg and lymph-scrotum were found to co-exist in the same patient. Moreover, the periodical attacks of fever, from which the patient suffered, were accompanied by simultaneous pains and swelling of both the legs and the scrotum. This case would seem to furnish in itself sufficient evidence of the identity of the diseases. All surgeons, who are in the way of meeting with cases of elephantiasis, are familiar with the fact that elephantiasis of the scrotum, in its early stages, frequently resembles lymph-scrotum in appearance, and is subject to similar discharges of lymph. It is also not an uncommon experience to find 'lymph-scrotum' occurring in the neighbourhood of the cicatrix left after the removal of elephantiasis of the scrotum; and the latter disease has been known to follow the removal of a lymphangiectasis of the lymph-glands of the groin. A third and most forcible argument in favour of the identity of

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1. Vogt-Moller, P., Tier. Rund., 1942, 48.

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Fig. 1

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Fig. 2



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these diseases is the fact that both are characterized by periodical attacks of fever of a similar type and accompanied by swelling and pain of the affected area of the body, as well as of the lymphatic glands which drain that area.

The only argument, so far as we are aware, that has ever been brought forward against the identity of these diseases is the fact that filarial embryos are rarely found in the blood of patients suffering from elephantiasis. But filarial embryos are not always found in the blood in cases of undoubted filarial disease, such as chyluria; in fact a large proportion of such cases are distinguished by the absence of any hæmatozoa. The absence of embryos from the blood is an indication either that the parent worms are dead, or that the lymphatic channels which they inhabit are completely shut off from communication with the blood stream—nothing more. The pathological conditions which characterize elephantiasis are such that filarial embryos cannot penetrate to the blood stream.

When elephantiasis is fairly established, the locality inhabited by the filariæ is shut off from the rest of the lymphatic channels, so that even if the parent worms be still alive, their offspring cannot find their way into the blood stream.

Hence embryo filariæ are hardly ever seen in the blood in cases of elephantiasis.

That there are a small number of cases of elephantiasis of the limbs that are not of filarial origin is not disputed. Any lesion, which results in complete stagnation of the lymph circulation in a limb, will produce elephantiasis. Numerous cases of elephantiasis have been recorded as occurring in persons, who had resided the whole of their lives in the British Isles, and Hutchinson draws attention to cases of recurring erysipelas associated with elephantiasis and unconnected with filarial disease.

We cannot do better than conclude with the following quotation from Manson: 'If we do not accept the parasitic theory as explaining tropical elephantiasis, then we are obliged to conclude that in the tropics there are two forms of this disease; that they affect the same parts of the body, are found in the same districts, are characterized by the same sort of fever, inflammation of the lymphatics, and skin lesions: that, in fact, they are in every respect identical, and only differ in their ætiology. I think this is so unlikely that few on reflection will maintain it'.

Current Topics, Etc.

Latent Syphilis. Study of One Hundred and Sixty-nine Cases Observed for Ten Years or More

By J. W. JORDON
and
F. A. DOLCE

(From the *Bulletin of Hygiene*, December 1946, Vol. 21, p. 810)

This study comprises 169 patients observed for ten years or more, of whom 100 were well treated and 69 poorly treated or untreated; the former (group II) received 40 or more injections of an arsphenamine and bismuth, the latter (group I) less than 40. Group I included 19 white men, 11 white women, 19 Negro men and 20 Negro women; they were observed for an average period of 13 to 14 years, the longest period being 29 years; they received an average of 5.8 injections of arsenic and 5.5 of bismuth. During the period of observation, serum reactions showed considerable fluctuations, positive reactions often becoming negative and then positive again without treatment.

Twenty-seven of these 69 patients developed complications, of which cardiovascular lesions were by far the commonest; this figure may be unduly high because of the large proportion of Negroes, but the authors estimate that 20 to 25 per cent of poorly treated latent syphilitics may be expected to develop cardiovascular lesions in later life.

Among the 16 patients with negative serological reactions for 4 years, none had certain and three had probable late complications; of the 24 whose reactions varied, two had certain and one probable complications; of the 29 whose sera were consistently strongly positive, 23 had certain complications. These facts suggest that a persistently positive reaction is a bad prognostic sign, whereas a fluctuating reaction or one which reverses carries a good prognosis; the incidence of late complications was 55.5 per cent in those patients who gave a history of primary or secondary syphilis, whereas it was only 39.2 per cent in the whole group: this suggests that the theory that frank early syphilis protects against late complications is not valid.

Group II included 37 white men, 35 white women, 15 Negro men and 13 Negro women: they were observed for an average of 11.3 years, the longest period being 19 years; they received an average of 28.7 injections of arsenic and 78 of heavy metal.

The reactions of these patients fluctuated considerably. From the serological point of view those who received 20 to 29 arsenical injections progressed most favourably, further injection gave no better results and the amount of heavy metal had no appreciable effect on serological outcome. It is suggested that 20 to 29 injections of arsenic and 40 to 60 of bismuth constitute the optimum total dosage and that arsenic is more effective than heavy metal. Only 4 of the 100

patients in group II developed complications, so that it is clear that adequate treatment reduces the hazard of late effects and improves the prognosis.

It is of interest that one patient in group I who had a negative cerebrospinal fluid developed paresis fourteen years later.

Arsenical Dermatitis Successfully Treated with BAL

(Abstracted from the *British Medical Journal*, 26th July, 1947, Vol. II, p. 132)

In a memorandum published in the *British Medical Journal*, 26th July, 1947, p. 132, J. Lawrence Reeve records the following two cases:—

Case 1.—A labourer, aged 27, first attended the V.D. clinic at the Royal Victoria and West Hants Hospital, Bournemouth, had a large ulcer at the base of the glans penis, and dark-ground examination revealed the presence of *Treponema pallidum*. Treatment was started at once with 300,000 units of penicillin twice daily for five days, together with N.A.B. and bismuth. He was given 0.45 grain of N.A.B. twice weekly for four injections, followed by 0.6 grain twice weekly for a further eight injections—a total of 6.6 grains of arsenic. Bismuth 0.2 grain twice weekly was given for six weeks, total 2.4 grains. An erythematous rash with desquamation appeared on the limbs and trunk on the 11th day of commencement of treatment. The patient was given daily intravenous injections of 6 ml. of calcium thiosulphate for 7 days. There was no improvement; he then had oedema of the hands, fissuring of the palms with some exfoliation, and similar fissures at the ankles and on the soles of the feet. There was oozing from all fissures. Then treatment with 2 ml. of BAL (British anti-lewisite) intramuscularly every four hours was started. The next three days he had 2 ml. twice a day and then 2 ml. a day for two days. In less than a month the hands and feet were quite healed and the patient was back at work.

Case 2.—A housewife, aged 26, first attended the V.D. clinic on 18th September, 1946, with a secondary syphilitic rash involving the arms and trunk (Wassermann ++, Kahn +++). There was some dental sepsis, but as she was seven months' pregnant it was thought advisable to prescribe arsenic and bismuth as well as penicillin. She was given 600,000 units of penicillin daily from 25th September to 1st October; three injections of 0.45 grain and five of 0.6 grain of N.A.B. (a total of 4.35 grains of arsenic) and eight injections of 0.2 grain of bismuth between 25th September and 23rd October. On 30th October, erythematous patches with oedema were noticed on the buttocks, and smaller patches were seen at the bends of the elbows. Calcium thiosulphate, 6 ml., was prescribed twice weekly till 15th November. As there was no improvement, BAL was given from 22nd November to

25th November. Owing to her confinement the patient did not attend again until 22nd January, 1947, when no rash was to be seen, and she stated that it had quite disappeared before her confinement on 17th December.

It seems to the writer that BAL may well be the answer to the syphilologist's prayer, for, instead of cases of arsenical dermatitis being in hospital for weeks at a time, they may now be treated as out-patients. The response is most dramatic, as the rash begins to clear as soon as treatment is started.

The Berger-Kahn Test for Syphilis

By J. H. FODDEN

and

E. J. MADDUX

(Abstracted from the *British Medical Journal*, 26th July, 1947, Vol. II, p. 131)

It was found that certain dyes when mixed with a suitable alcoholic heart extract caused, in syphilitic sera, not only the formation of coloured precipitates but also an increase in the sensitivity of the reaction which was directly proportional to the amount of dye present in the antigen. Janus green and Victoria blue were the dyes of choice, as they appeared to be the best sensitizers and in their presence heavy flocculation rapidly occurred. Sera containing amounts of syphilis antibody too small to react with a given antigen without dye showed marked flocculation in the presence of Victoria blue or Janus green. Victoria blue is better, as very fine dispersion of the alcoholic antigen could be obtained with this dye as compared with Janus green.

For the purpose of the investigation the writers carried out in triplicate 970 routine serological test for syphilis.

The standard antigen for the Kahn test as supplied by the Ministry of Health Special Laboratories was used.

A stock antigen (which keeps for at least a year at room temperature) is prepared thus: To 10 parts of standard antigen containing 0.6 per cent of cholesterol and having a titre of 1 + 1.2 add 1 part of tinct. benz. co. B.P. To 10 ml. of this mixture add 17 mg. of Victoria blue 4R (Gurr). The container should be kept well stoppered.

Method of Test

(1) Pipette 1 part of the stock antigen (0.1 ml.) into the bottom of a dry tube. (2) Add 10 parts (1 ml.) of 0.85 per cent sodium chloride solution rapidly to the tube from the pipette. This dispersed antigen is sufficient for at least thirty tests, and can be used at once or during any time on the day of preparation. It should be shaken immediately before use. (3) Place on a prepared glass slide one drop of the serum to be tested and add a drop of equal size

of the dispersed antigen. (4) Mix the drops with a glass rod, rock the slides for two minutes, and read results immediately. (5) The results are read macroscopically, and as a distinct aid to easy reading the slide is held over a sheet of white paper. Positive reactions show large deep blue floccules easily visible in a water-clear fluid. Negatives at two minutes show no flocculation whatever, the mixed drop remaining quite homogeneous and of a sky-blue colour.

The standard Kahn method often showed lower numerical grading, and in the case of weak positives by the other methods some were missed. This was particularly marked when dealing with old treated cases. Difficulty in reading weakly positive standard Kahn tests is overcome in the Berger-Kahn test by the pronounced staining of the floccules which occurs. The strongly positive sera are easily read, as the floccules in this case are very large and absorb the whole of the dye. In the writers' experience, whenever this result was obtained they always noticed that the Wassermann reaction read 2 + or 3 +. The writers wish to emphasize that every one of their positive Wassermann results gave a positive reaction with the Berger-Kahn test.

Comment

The reaction should be read at two minutes, and not four minutes as recommended by Berger, as reading at the latter time yields a high proportion of mixtures showing very faint granularity, which can lead to some confusion.

Berger made no reference to the gradation in size of the blue floccules in assessing the strength of a positive result. It is quite easy to grade positives on the size of particles given by the Berger-Kahn test. We found such gradation in particle size very constant and most helpful.

A. B. R. C.

The Rapid Treatment of Syphilis

(Abstracted from the *Medical Journal of Australia*, 28th June, 1947, Vol. I, p. 791)

A NEW report now comes from the New Mexico Intensive Treatment Centre, where all stages of syphilis except late syphilis of the central nervous system were treated. Five different schedules of rapid treatment have been used over a period of two years. The schemes of treatment employed were as follows: (a) The 'modified Schoch régime', in which a daily injection of 'Mapharsen' was given on six days a week for twenty doses, together with a weekly injection of 200 milligrammes of bismuth subsalicylate. The dose of 'Mapharsen' was 0.6 gramme for adults weighing more than 120 pounds, smaller patients receiving proportionately less. (b) The 'multiple injections—25-day schedule', in which daily injections of

'Mapharsen' were given (on six days a week) for a total of twenty-two injections, the dosage being the same as in the previous method. A dose of 200 milligrammes of bismuth subsalicylate was given on the first day of treatment and repeated with every fifth 'Mapharsen' injection. (c) The administration of penicillin alone by sixty injections of 40,000 units each every three hours, a total of 2,400,000 units in seven and a half days; no follow-up treatments were given. (d) The '8-6-3 schedule'. During an eight-day period eight daily injections of 'Mapharsen' were given, the dosage being as in the previous methods, with three injections of bismuth subsalicylate (on the first, fifth and eighth days), and penicillin in doses of 10,000 units every three hours for sixty injections. (e) The '5-12-3 schedule', during a nine-day period, five injections of 'Mapharsen' were given (on the first, third, fifth, seventh and ninth days), with three injections of bismuth subsalicylate, each of 200 milligrammes (on the first, fifth and ninth days), and seventy-two injections each of 16,667 units of penicillin every three hours to a total of 1,200,000 units. Serious reactions to these schemes of treatment were few. Five cases of arsenical dermatitis occurred, two of which followed the 'multiple injections—25-day schedule' and one each from the other three methods which included arsenic therapy. All patients responded well to local treatment and the use of BAL. One instance of agranulocytosis occurred in a patient receiving the 'multiple injections—25-day treatment'. The most serious reactions were in patients who developed encephalopathy while being treated by the '8-6-3' régime; these patients nearly died, but recovered with no sequelæ after the use of supportive therapy, sedation and BAL.

All five methods were considered effective in rendering patients non-infective in a short time. Under hospital conditions they are regarded as safe for use by medical personnel trained briefly in the relevant techniques and indications, except for the '8-6-3 schedule'. The technique showing the best results by serological standards was the '8-6-3' régime; by the use of this method, 80 per cent of all patients suffering from secondary syphilis were treated with satisfactory results. The '8-6-3' régime is, however, not considered safe, and the '5-12-3' technique, the use of which has not been followed by the same toxic manifestations, is thought to be the most promising method. The least satisfactory results were obtained with the 'modified Schoch' method. The penicillin régime is undoubtedly the safest, but the percentage of unsatisfactory results from its use in these investigations was disappointingly high. For the present, however, arsenic seems indispensable, at least for certain phases of the infection. The most effective attack on syphilis appears to require the combined forces of arsenic, penicillin and bismuth.

A. B. R. C.

Studies of Maternal and Infantile Blood Factor Relationships

By LUCY M. BRYCE
RACHEL JAKOBOWICZ

and

NORMA McARTHUR

(Abstracted from the *Medical Journal of Australia*, Vol. II, No. 7, 17th August, 1946)

ALL blood samples were tested for the Rh factor with a potent standard (anti-Rh₀) serum of appropriate group or absorbed with cells or saliva on glass slides. Samples not agglutinated by this standard serum were retested with an anti-Rh₁ (anti-Rh₀') serum. It is recognized that a few patients classified as Rh-negative by this method may have belonged to subgroup Rh" as no anti-Rh" serum was available at the time when these studies were made.

The total number of women examined at the first visit to the antenatal clinic was 2,230.

The iso-agglutinin titres obtained in pregnant women ranged from 4 to 4,000 with a mean of 107.08 ± 4.68 for anti-A and 46.28 ± 1.52 for anti-B.

Out of 2,230 women the group of 850 mothers and babies may be divided into four sections: (i) Those in whom the major blood group factors (A, B, O) and Rh factors are either the same or compatible. Compatibility comprises a combination of a mother of blood group A, B or AB with a child of blood group O, and an Rh-positive mother with an Rh-negative child. It may be noted that the combination which potentially could stimulate Hr antibodies in the maternal serum is not possible with an Rh-negative child. (ii) Those with incompatible A and B factors, but compatible Rh status. (iii) Those with the same or compatible A and B factors, but incompatible Rh status. (iv) Those with potential incompatibility of both A and B factors and Rh status.

These four sections have been analysed with a view to detecting whether there is a significant difference between them in respect of possible damage to the foetus or the infant. This possible damage has been considered under the headings of stillbirth, premature birth, *icterus gravis*, jaundice of lesser degree, and anaemia. With regard to anaemia, for the purpose of this analysis, we included only cases in which anaemia was detected during the first few post-natal weeks in babies who did not earlier display any of the other manifestations considered possibly attributable to heterospecific pregnancy.

It is noteworthy that in the third and fourth sections, together include all cases of Rh incompatibility, the incidence (28.6 per cent) of abnormalities in the baby is almost double that of the incidence (14.5 per cent) in the first and second sections, in which the Rh status of the mother and that of the child are compatible. The difference is statistically significant. On the other hand, if the first and second sections are compared with each other, the percentage of abnormalities in the first section in which A, B, O factors are compatible is approximately 14 per cent, and in the second section, in which the A, B, O factors are incompatible, it is 17 per cent. This difference is not statistically significant, nor is there any significant difference between the third and fourth sections, in which, however, the numbers may be too small for valid comparison. It is to be noted, however, that while the highest incidence of definite *icterus gravis* occurs in the groups in which Rh status incompatibility exists, the incidence of anaemia is highest in the group in which A, B, O incompatibility is present. While the number of cases of anaemia is not large enough for effective comparison, it is considered possible that this condition either occurring alone or preceded earlier by relatively mild jaundice, may be a more frequent result of A, B, O incompatibility than are the more dramatic and fulminating forms of haemolytic disease, which can usually be correlated with Rh incompatibility.

There are, in the present series, four cases of *icterus gravis* in which Rh incompatibility could not be detected, but in which an A, B, O incompatibility was present. In all of these four cases of *icterus gravis*, and in all cases of anaemia so far detected in this series, the mother's serum titre for the incompatible A and/or B factor was appreciably higher at or after delivery than it had been at the first test during pregnancy; but it must be noted, on the other hand, that there are many cases in which a rise in titre, particularly after delivery, has no apparent deleterious effect on the foetus or infant.

The incidence of 10 cases of *icterus gravis* in 850—that is approximately 1 in 85—is higher than is usually estimated.

In agreement with other workers the writers have found that the titre of Rh-antibodies in the maternal serum bears no relation to the severity of the disease in the child, nor in every case to the number of previous opportunities for stimulation.

All the nine cases of anaemia occurring as the only manifestation of haemolytic disease were found in first, second or third babies, and seven of them were found to be associated with A, B, O incompatibility.

Theoretically, maternal immunization could be brought about by the escape of foetal red cells or by the diffusion of specific soluble substances from the foetal to the maternal circulation.

An investigation, so far comprising 111 cases, has been made of the relationship between fluctuation of iso-agglutinin titre in the maternal serum during pregnancy and foetal incompatibility. In 45 of these 111 cases, mother and child were of compatible blood groups, and in none of these was a rise in agglutinin titre demonstrable eight to ten days after delivery. Eight of these 45 children were tested and seven were found to be secretors. In the remaining 66 cases of this series the child's blood group was incompatible with that of its mother. Of these 66 cases, in 35 a rise occurred in maternal agglutinin titre and in one a fall in blood taken eight to ten days after delivery. Twenty-eight of the children whose mother's serum titre had risen or fallen were found to be secretors. The remaining eight children were not tested. No alteration was detected in the maternal serum titre in 30 of the 66 cases in which incompatibility was present. Fourteen of the children in this group were found to be non-secretors and nine to be secretors, and seven were not tested. It is possible that if more frequent testing of the maternal serum had been practicable a rise in titre would have been detected in more of these cases in which the child was a secretor. Even as they stand, however, the figures suggest a relationship between the secretor state of the child and rise in the corresponding maternal agglutinating titre. They therefore support the contention that iso-immunization is usually brought about by passage of water-soluble group-specific substances across the placenta.

The data elicited from the interviews with 100 each of Rh-positive and Rh-negative women are given in table VIII and illustrated in figure 2. Miscarriages, abortions and stillbirths are all included in this table under the heading of foetal deaths. Among these women it will be seen that the difference between the number of foetal deaths occurring in the Rh-positive and Rh-negative groups.

Analysis of data concerning 1,379 parous women obtained from the recorded histories also shows that while the total incidence of abortions, stillbirths and prematurity (collectively termed accidents) is of a similar order among Rh-positive and Rh-negative women, there is a significantly greater proportion of such accidents in the first pregnancy among both Rh-positive and Rh-negative women than in the second and third. It is interesting to note that in this series there were three Rh-negative women who each had had seven pregnancies all resulting in living children, one who had had eight (all children living), one who had had nine (eight living children), and one who had had fifteen pregnancies and fifteen living children.

The potential danger of accidents of pregnancy arises most frequently in the cases in which Rh-negative women have Rh-positive foetuses. This is inevitable if the mating has been with a homozygous Rh-positive male—that is, in about 38 per cent of all matings. Fifteen per cent of matings will be with Rh-negative men and the remaining 47 per cent with heterozygous Rh-positive men. The latter matings will give even chances of the child's being Rh-positive or Rh-negative. However, the liability to such accidents is much less than these figures would suggest, as approximately only 1 in 50 of all Rh-negative women are readily sensitized by an Rh-positive foetus.

On Complete Removal of the Prostate. A Preliminary Communication

By H. S. SOUTTAR, C.B.E., M.Ch., F.R.C.S.

(Reproduced from the *B.M.J.*, 28th June, 1947, p. 917)

It will be generally agreed that the extravasical approach to the prostate introduced by Millan presents considerable advantages over the older transvesical methods. It enables one to observe every step of the operation in a way which was formerly impossible, bleeding is readily controlled, and the post-operative period is short and easy. Some recent experiences have, however, suggested to me that the operation for prostatic obstruction performed by this route is still capable of substantial development, and although some considerable time must elapse before this can be established it seemed worth while to place these experiences on record.

HISTORY OF A CASE

In operating a short time ago upon a man of 75 with obstruction of some standing I was surprised to find that instead of enucleating an adenoma as I intended I was enucleating the entire prostate, which had become detached from the triangular ligament. Moreover, on drawing the prostate away from the triangular ligament a tube of urethra emerged from that structure as a substantial muscular cylinder four centimetres in length. The only course was to divide this tube close to the prostate, which was then easily excised from the neck of the bladder after division of the ejaculatory ducts. The urethra was sutured to the neck of the bladder, and the latter was then sutured firmly to the triangular ligament, completely obliterating the prostatic cavity. To my great relief the operation was a complete success, the patient, a rather feeble old man, passing water normally on the sixth day.

ANATOMY OF THE PROSTATE

On discussing the case with Prof. Wood Jones he told me that the free urethral tube is a fact of normal anatomy, although it was quite new to me, and I know of no reference to it in any textbook. What was abnormal in my patient was the ease with which the prostate became detached. I have since carried out a

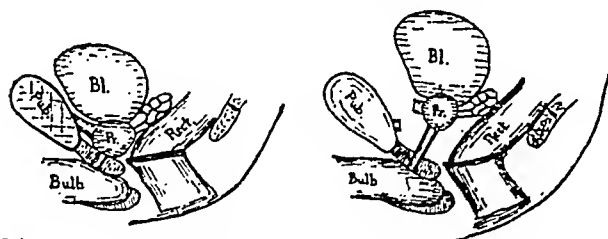


Fig. 1.—Normal anatomy.

Fig. 2.—Ligaments divided; prostate retracted.

number of dissections which fully confirm this view. The normal anatomy is as follows:

The prostate is attached to the back of the pubes by two dense bands of great strength—the pubo-prostatic ligaments. Each of these forms a rounded

tendon three or four millimetres in diameter, separated by a deep recess, the cave of Retzius, into which emerges the dorsal vein of the penis. On dividing these ligaments the prostate is easily shelled out from its bed,

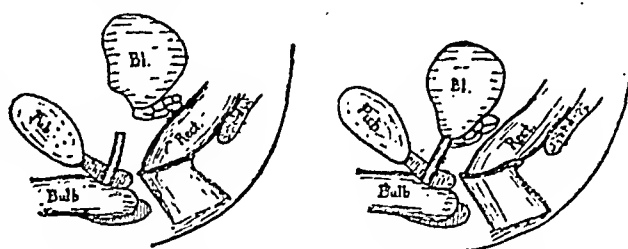


Fig. 3.—Urethra divided; prostate excised.

Fig. 4.—Urethra sutured to bladder.

which is formed in front by the levator prostatae muscles and further back by the dense fascia of Dénonvilliers, which separates the prostate from the rectum. As the prostate is drawn upwards the membranous urethra emerges from the compressor muscles of the triangular ligament as a muscular tube three to four centimetres in length. It is true that a venous plexus is opened up, as this surrounds the prostate, but it does not appear to be of great moment and bleeding from it is easily controlled.

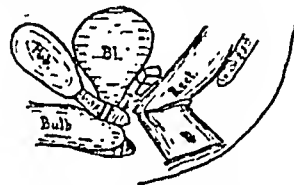


Fig. 5.—Bladder sutured to urogenital diaphragm.

The existence of this urethral tube is obviously of great importance, for it enables us to provide a complete epithelial lining after removal of the prostatic urethra, and would seem to avoid any risk of stricture. It is of course a fragile tube and requires careful handling, but it is substantial enough to allow of accurate suture into the neck of the bladder. It is convenient to proceed as follows:

OPERATIVE PROCEDURE

A No. 12 rubber bougie is passed into the urethra as far as the prostate or into the bladder. The prostate is exposed by a suprapubic incision and drawn upwards so that the pubo-prostatic ligaments are clearly seen. These ligaments are now divided, the bougie providing a guide to protect the urethra, when on drawing the

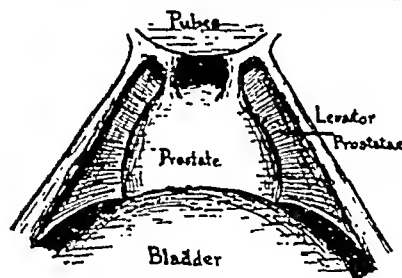


Fig. 6.—Normal anatomy.

prostate upwards the urethra will emerge from the triangular ligament carrying the bougie. The prostate can now be shelled out from its bed without difficulty; the bougie is withdrawn from it, but remains in the urethra, which is divided at the apex of the prostate. The prostate is turned forward and detached from the bladder after dividing the ejaculatory ducts. The bougie supporting the urethra is passed into the bladder and cut through a puncture in its wall. The urethra

is sutured with fine catgut to the neck of the bladder, which is now securely sutured to the triangular liga-

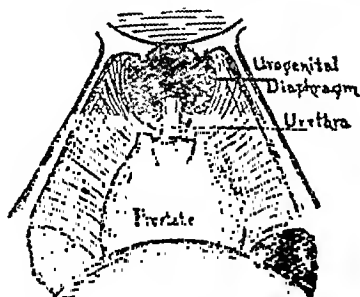


Fig. 7.—Ligaments divided; prostate retracted.

ment, obliterating the prostatic cavity. The bougie is withdrawn through the bladder so far that it remains as a support for the new junction between the bladder and the urethra. The bladder is drained by a suitable suprapubic tube, into which the end of the bougie may conveniently be fixed. The bougie may be removed in four days and the suprapubic tube as soon as it is certain that the patient can pass water.

COMMENT

The operation described is of course only a development of the brilliant operation devised by Millan, but it may be a development with considerable possibilities. If further experience confirms its practicability it would seem to present certain definite advantages. The prostate is removed as a whole and the technique of its removal is little affected by its precise pathology. Indeed, it might well be applicable to early carcinoma. The cavity left is completely obliterated and later hæmorrhage is unlikely. A complete urethra is provided from the outset and the risk of a stricture is minimized. So far the operation has been carried out in only a few cases, and obviously a wide experience will be required before its value can be assessed. But it would seem to be based on sound anatomical principles, and sufficient success has already been achieved to convince me that it is worthy of an extended trial.

Effect of Oxygen on Malaria (An *in vivo* Study in Ducks)

By R. H. RIGDON

and

NONA B. VARNADOE

(Abstracted from the *Journal of Laboratory and Clinical Medicine*, Vol. 32, No. 1, 1947, p. 57)

A study had been made to determine the effect of increasing the amount of oxygen available to ducks to see the effect upon the course of malaria infections and the results reported.

The authors placed normal ducks and ducks with a severe malarial infection in an oxygen chamber. Control experiments at the atmospheric pressure were also done.

The peak of parasitæmia was reached on the fifth day but the parasitæmia was much higher in those kept in the oxygen chamber than it was in the control group. A progressive decrease occurred in the number of red cells and in the hæmatocrit readings in all ducks regardless of whether they were in the control group or in the oxygen chamber. The red blood cell counts and the hæmatocrit readings of non-malarial birds kept in the oxygen chamber with the infected birds decreased during the first four days following which time they rapidly increased to within the range of normal. Normal ducks used for the controls did not show any significant variation in the red cell count

and hæmatocrit reading during a corresponding interval.

Ducks with a high degree of parasitæmia survived for a much longer time (10 to 18 hours longer) when put into a chamber with a high concentration of oxygen than similarly infected ducks kept at normal atmospheric pressure.

The increased amount of oxygen apparently helps to compensate for the decrease in the amount of hæmoglobin which is present in the highly infected birds. The anæmia results from the rapid destruction of red cells by the plasmodia. The important factor in all types of acute malaria seems to be the rapidity in which the anæmia may develop. The fact that ducks with a severe malarial infection showed immediate improvement, either following a transfusion with duck red cells shown elsewhere or when they are put in the presence of an increased concentration of oxygen in these experiments, would suggest that clinical subjects with acute malaria and symptoms of shock should be given a transfusion and placed in an oxygen chamber at the same time that a plasmodial drug is given.

Experimental and clinical studies elsewhere indicated that shock may occur in severe malarial infections. In the treatment of shock from any cause, all efforts should be directed to improve the circulation of blood through the tissue so that oxygen can be delivered at a higher partial pressure. A 100 per cent concentration of oxygen had been administered to patients for forty-eight hours without any evidence of pulmonary irritation.

There is however nothing in the experimental studies to indicate that oxygen *per se* will cure malaria.

As far as it is known there are no contradictions to the use of transfusions and oxygen in the treatment of a patient with malaria.

A. B. R. C.

Lobectomy Brings Low Mortality

(From the *Journal of the American Medical Association*, Vol. 133, 26th April, 1947, p. 1284)

ALTHOUGH the operation of lobectomy has been performed for many years, its value and the low operative mortality of the procedure may not be fully appreciated. Recently, Meade and his colleagues discussed results of 236 lobectomies performed at the Kennedy General Hospital between November 1943 and May 1946. Lobectomy was performed for bronchiectasis, pulmonary cyst, chronic suppuration, bronchial adenoma, adenomatosis, tuberculosis, neurogenic sarcoma and actinomycosis. Bronchiectasis was by far the most common indication. Only one patient died. This report offers a splendid illustration of the effectiveness and especially of the safety of lobectomy as performed to-day.

Hunger CEdema

By F. A. DENZ

(Abstracted from the *Quarterly Journal of Medicine*, Vol. 16, January 1947, p. 1)

1. TOTAL plasma-proteins are decreased in cEdema cases. Mean values of 5.24 gm. per 100 c.c. of plasma in slight cases, 5.07 in moderate cases, and 4.90 in severe cases were obtained as compared with 7.04 gm. per 100 c.c. for a normal control group. Plasma-albumen values in 14 cEdema cases ranged from 2.58 to 3.81 gm. per 100 c.c. of plasma. The lowered plasma-proteins are believed to result in the accumulation of cEdema that commences with the first lowering of the protein level. The view that there is a critical level of plasma-protein for the production of cEdema is not accepted.

2. Plasma-volumes determined by the Evans blue method give values from 1.74 to 3.30 litres per sq.

metre of body surface. High values were obtained while oedema was present, and where the examination was repeated after loss of oedema the plasma-volume fell to normal. This fall in plasma-volume was associated with hæmoconcentration as shown by a rise in hæmoglobin and plasma-protein. This was taken to indicate that hydræmia occurs in hunger oedema.

3. Four cases of apparently cured oedema were exercised with reappearance of the oedema. Two cases with oedema were exercised while on full diet with persistence of the oedema until the patients were allowed complete rest. Exercise appears to be a potent factor in the production and retention of oedema.

4. Daily plasma-protein determinations on oedema cases showed a diurnal variation which was probably due to variation in the degree of hydration of the blood.

5. The inaccuracy of the clinical assessment of oedema is illustrated by a patient showing minimal oedema who lost 8½ litres of oedema fluid. This case is contrasted with another showing severe oedema, but losing only 2 litres of oedema fluid. It is shown that much excess fluid may be hidden in the deeper connective tissues of the mediastinum and abdomen.

6. The extracellular fluid volumes have been determined by the thiocyanate method and in non-oedematous cases ranged from 20 to 28 per cent of body weight. Extracellular fluid volume is shown to decrease in loss of oedema.

7. Urinary chloride excretion was high during loss of oedema. While as much as 28 gm. of chloride were being lost per diem, the kidney excreted a urine of chloride concentration greater than that of the plasma, with resultant fall of plasma-chloride concentration. During periods of exercise while oedema fluid is collecting, the urinary chloride concentration is less than that of the plasma, indicating chloride retention. These changes are believed to be the result of the tubular activity.

Medicolegal

ABNORMALLY LONG PREGNANCY RAISES NO PRESUMPTION OF INFIDELITY

(Abstracted from the *Journal of the American Medical Association*, Vol. 133, 1st February, 1947, p. 347)

THE husband filed suit for divorce on the ground of adultery, the case being heard in the Supreme Court, special term, Queen's County, New York.

The partners were married on 12th March, 1944. On 24th April, 1944, the plaintiff, an officer of the merchant marine, left the country for duty in the Pacific, returning to the United States, 4th January, 1945. On 14th April, 1945, the defendant gave birth to a child which she claims is the child of the plaintiff. The plaintiff offered no evidence of any misconduct on the defendant's part but asked for a decree solely on the hypothesis that it is impossible for a period of 355 days to elapse between coition and parturition.

A gynaecologist who taught at the Yale Medical School, called as an expert witness by the plaintiff, testified that the accepted period of gestation is 270 days, with the longest authenticated period being 320 days. He admitted that there was a non-authenticated case of 369 days. A physician called by the defendant as an expert testified that the ordinary period of gestation is 280 days, or ten lunar months, but there are instances of 328 days and 344 days.

The physician who attended the defendant during her pregnancy testified that the defendant came to

her on 14th November, 1944, complaining of pain in the right side of the abdomen and said that she had previously had pain in the left side of the abdomen. The defendant informed the physician that her last menses was on 4th October, 1944, and that the last time she had seen her husband was 24th April, 1944. The physician advised her that the birth should take place about the end of January 1945. The defendant immediately wrote to her husband and informed his family as well as her own friends and family. On 5th February, 1945, when she examined the defendant, the physician said she found the head of the fœtus engaged, a position of the head which generally occurs about a month prior to birth. In the light of this testimony, said the court, the birth should have occurred about 5th March, 1945, which would have been 316 days from coition, a not improbable period of gestation. On 19th February, 1945, however, the physician again examined the defendant and, finding no sign of impending birth, recommended that the defendant go into a hospital. The defendant spent three days in a hospital, 28th February, 1st March and 2nd March, during which time she received treatment to induce labour. These treatments were ineffectual, however, and the defendant returned to her home, finally giving birth to a 9 pound child on 14th April, 1945. The physician stated that on every examination of the defendant the fœtus was small.

It thus appears, said the court, that while the duration of pregnancy was 355 days, the head of the fœtus was engaged for at least 68 days, which presents a question as to whether the last forty days were a part of the period of gestation proper or were due to difficulty in delivering the child.

In an English case decided in 1921, there was no evidence of misconduct on the part of the wife except the lapse of time between coition and the birth of the child, which was 331 days. Three leading medical authorities testified that such an interval could not be said to be impossible. Viscount Birkenhead in dismissing the petition said:

In this case the only evidence of adultery is the admittedly abnormal length of pregnancy. No other fact or circumstance has been adduced which in the slightest degree casts any reflection upon the chastity or modesty of the respondent, who has, on oath, denied the alleged adultery. I can only find her guilty if I come to the conclusion that it is impossible, having regard to the present state of medical knowledge and belief, that the petitioner can be the father of the child. The expert evidence renders it manifest that there is no such impossibility. Under these circumstances I accept the evidence of the respondent and find that she had not committed adultery, and accordingly I dismiss the petition.

The New York court said that the presumption of legitimacy is one of the strongest and most persuasive known to the law. Even aside from this presumption, however, having regard to the evidence in this case and the present state of medical knowledge and belief, it cannot be said that it is impossible that the plaintiff is the father of this child. The expert evidence, plus the fact that the head of the fœtus was engaged for 68 days when birth normally occurs within a month after such engagement, 'renders it manifest that there is no such impossibility'. The court accordingly rendered judgment in favour of the defendant and dismissed the complaint.

BLOOD GROUPING TESTS HELD NOT TO BE CONCLUSIVE EVIDENCE OF PATERNITY

(Abstracted from the *Journal of the American Medical Association*, Vol. 133, 15th February, 1947, p. 498)

THE plaintiff, by her guardian *ad litem*, commenced a bastardy proceedings against the defendant for the

purpose of obtaining allowances for medical care, support and attorney's fees. From adverse portions of the judgment, the defendant appealed to the district court of appeal, second district, division two, California.

Prior to the plaintiff's birth, her mother and the defendant entered into a stipulation providing, among other things, that within four months after the birth of the child the plaintiff, the mother and the defendant would all submit themselves to a blood grouping test by certain physicians chosen in accordance with the provisions of the stipulation. The purpose was to determine the paternity of the child, and the stipulation was signed by the plaintiff's guardian *ad litem* and by the defendant. After the plaintiff's birth the tests were made, the physicians, whose qualifications, competence and integrity are not questioned, reporting as follows :—

Examination of the bloods of Charles Chaplin, Joan Berry and Carol Ann Berry give the following results :

	Group	Type
Charles Chaplin	O	MN
Joan Berry	A	N
Carol Ann Berry	B	N

Conclusion reached as the result of these blood grouping tests is that in accordance with the well-accepted laws of heredity, the man, Charles Chaplin, cannot be the father of the child, Carol Ann Berry. The law of heredity which applies here is 'The agglutinogens A and B cannot appear in the blood of a child unless present in the blood of one or both parents'.

Two of the physicians testified at the trial that the report truly represented their findings from the tests made. They and one other physician testified that by reason of said tests defendant was not and could not have been the father of the plaintiff.

Were the blood tests conclusive that defendant was not the father of the plaintiff? The court held that they were not and based its holding on *Arias v. Kalensnikoff*, 10 Calif (2d), 428, 74 p. (2d), 1043, the only reported case in California in which blood tests were used for the purpose of attempting to determine the parentage of a child. In that case the court held that the evidence concerning the blood test 'is expert opinion, because the conclusions reached by the examiner are based upon medical research, and involve questions of chemistry and biology with which a layman is entirely unfamiliar', but that such tests and the evidence thereof are not conclusive because not so declared by the code and further that expert testimony is to be given the weight to which it appears to be justly entitled. Continuing, the district court said, conceding the immutability of the scientific law of blood grouping, which we have no reason to question, the infallibility of the results of blood tests depends upon the skill employed in making them. Errors are reported due to (1) the lack of training of the serologist; (2) the use of commercial serums; (3) the failure to make a countertest. When scientific testimony and evidence as to facts conflict, the jury or the trial court must determine the relative weight of the evidence. The law makes no distinction between expert evidence and that of any other character. The decision in the *Arias* case, concluded the court, has been the subject of discussion and criticism in law reviews and other legal periodicals but not by other courts as far as we have been able to ascertain, and it remains the law of this state until modified or overruled by the court that rendered the opinion. Accordingly, the judgment in favour of the plaintiff was affirmed.

In a specially concurring opinion, one of the Supreme Court judges announced that he concurred in the judgment because of the fact that the court was bound by the decision of the Supreme Court in *Arias v. Kalensnikoff* but added that he believed that the Supreme Court was in error in its determination of that case. In his specially concurring opinion he said that the ascertainment of the factual truth in the

adjudication of any controversy is a consumption devoutly to be wished. Time was when the courts could rely only on human testimony. But modern science brought new aids. The microscope, electricity, x-ray, psychology, psychiatry, chemistry and many other scientific means and instrumentalities have revised the judicial guessing game of the past into an institution approaching accuracy in portraying the truth as to the actual fact where, in the pursuit of which, scientific devices may be applied. The chemical tests for learning the presence of poisons in the blood stream, application of the roentgen ray in defining the fracture of a bone, the use of the microscope in acquiring exact knowledge of the authorship of documents, of the presence of bacteria or of the prevalence of white corpuscles—all argue eloquently for a reliance on scientific devices for truth. If the courts do not utilize methods for acquiring accurate knowledge of pertinent facts, they will neglect the employment of available potent agencies which serve to avoid miscarriages of justice. In conclusion the concurring justice said in the case at bar a widely accepted scientific method of determining parentage was applied. Its results were definite. To reject the new and certain for the old and uncertain does not tend to promote improvement in the administration of justice.

Reviews

PRACTICAL PHYSIOLOGICAL CHEMISTRY.—By Philip B. Hawk, Ph.D., Bernard L. Osor, Ph.D., and William H. Summerson, Ph.D. Twelfth Edition. 1947. J. and A. Churchill Limited, London. Pp. xiv plus 1323 with 329 figures and 5 plates. Price, 50s.

This popular book has reached its twelfth edition, the first edition having been published in 1907. The number of editions that it has passed through is sufficient proof of its usefulness.

The book has been divided into 36 chapters and an appendix. It is indeed a pleasure to read this new volume. The authors have revised the book in a very thorough manner to bring it abreast with the recent advances in physiological chemistry. Many new items have been added and new tests described. The introduction of new sections on the polarigraph, on isotopes, on the Warburg tissue-slice procedure, on metabolic antagonists and antibiotics, on the sulfa drugs, on the electrophoretic fractionation of the plasma proteins, on the composition of foods, etc., has greatly enriched this book. Useful informations have been incorporated on many recently introduced drugs and new illustrations have been added. The appendix has been thoroughly rewritten with important additions. It contains a good deal of information which is of great help to the laboratory worker. One can rely on this book. The get-up is very good.

The authors have to be congratulated for bringing out this up-to-date edition which we recommend unreservedly.

P. D.

EXPERIMENTAL PHYSIOLOGY FOR MEDICAL STUDENTS.—By D. T. Harris, M.D., D.Sc., F.Inst.P. Fourth Edition. 1947. J. and A. Churchill Limited, London. Pp. xi plus 298, with 257 illustrations and plate in colour. Price, 18s.

This ideal book for practical work on physiology consists of 18 chapters besides a good introduction containing a group of exercises for selection of experiments for practical work. The chapters on the circulation, especially, are very valuable as those will

give the students a very good knowledge of the basic subject. Useful experiments have been described on the central nervous system and sense organs. The experiments described will give the students a good insight into the subject of physiology. Many of the exercises are of applied nature and will increase the interest of the students for the study of medicine. The inclusion of chapter XVIII on exercises in experimental pharmacology has increased the usefulness of this book. The diagrams given are simple and adequate. The paper and printing are excellent and the price moderate.

P. D.

PHARMACOLOGY AND THERAPEUTICS.—Originally written by Arthur R. Cushney, M.A., M.D., LL.D., F.R.S. Thirteenth edition thoroughly revised by Arthur Grollman, A.B., Ph.D., M.D., F.R.C.P., and Donald Slaughter, B.S., M.D. J. and A. Churchill Limited, London. 1947. Pp. 868 with 74 illustrations. Cloth price, \$8.50

CUSHNEY's textbook on pharmacology has been an authoritative work on the subject since 1899. Professors C. W. Edmunds and J. A. Gunn prepared the ninth to twelfth editions and the present editors were appointed to prepare the next edition after the death of Professor Edmunds and resignation of Professor Gunn.

The editors have aimed at writing a textbook of pharmacology for students and practitioners of medicine, a compendium of pharmacological knowledge. In recent years pharmacology has progressed extensively in almost all its aspects. This has involved considerable enlargement and revision of the text. The sections on chemotherapy, endocrines and vitamins have been rewritten. The vitamins particularly have been described in fuller detail than is usual in the textbooks of pharmacology. Most of the new remedies of proved therapeutic value have been described. In describing the actions of drugs more stress has been laid on evidences obtained from clinics than on those from laboratories of animal pharmacology. The chemical formulae and structure of the drugs have been extensively given. By wise pruning of discussion and deletion of much of the pharmacology on isolated organs the editors have succeeded in keeping the size of the book convenient in spite of the incorporation of the many newer drugs.

In a book which is so extensively used by students of medicine more precise direction regarding administration of drugs would have been welcome. Granuloma inguinale (p. 162) is not caused by a *Leishmania* organism but by a bacterial parasite of the Friedlander group. A fuller discussion as to the mechanism of absorption of iron is demanded from 'Cushney's' book. Toxic action of mercurial diuretics has not been mentioned. The modern synthetic ointment bases certainly merit a place in a book of this size.

The book will continue to maintain its pre-eminent position as a textbook of pharmacology for students of medicine.

J. C. G.

THE INDIAN PHARMACOPŒIAL LIST, 1946.—Published by the Government of India, Department of Health, New Delhi

The list has been compiled by the Indian Pharmacopœial List Committee under the chairmanship of Colonel Sir Ramnath Chopra appointed by the Drugs Technical Advisory Board with the approval of the Government of India at the instance of the Government in 1944. The preparation of the list was conducted under great stress and pressure as the government fixed only six months or so for the submission of the list in its final form.

In its general plan it follows the practice of the British Pharmacopœia—synonym, Indian name, source and preparation, composition, characters, tests of identity and purity, assay, storage, preparation and dose in metric and English units. In accordance with

the terms of reference the committee have included only those drugs in use in India which although not included in the British Pharmacopœia are of sufficient medicinal value in the list. It also includes Indian substitutes of some of the B.P. drugs which, though they do not conform to the B.P. standard of purity, possess equal medicinal properties. It further includes B.P. drugs of Indian origin which differ in minor points from the B.P. standards. Standards for certain substances used in medical practice of animal and bacterial origin manufactured in India have been described. The committee have opined that the scantiness of reliable and accurate chemical, pharmacological and controlled clinical data made the task of selecting drugs of sufficient medicinal value and describing their tests of purity and identity very difficult. There is bound to be difference of opinion about some of the drugs in the list but that the committee has succeeded so remarkably in compiling such a useful list with all the useful data in such short a time is a matter of great credit to the committee.

We hope that in no distant future an Indian Pharmacopœia will be compiled by the Pharmacopœia Committee.

J. C. G.

RADIUM DOSAGE: THE MANCHESTER SYSTEM.—

Edited by W. J. Meredith, M.Sc., F.Inst.P. 1947. E. and S. Livingstone Limited, Edinburgh. Pp. vii plus 124 with tables. Illustrated. Price, 15s.; postage, 8d. (home)

THIS most valuable book includes and summarizes a number of papers by Dr. Ralston Paterson and his co-workers at the Holt Institute in Manchester. These papers date from 1934 onwards, many of them having been published in the *British Journal of Radiology*. The first papers in this series published by Paterson and Parker pointed out the necessity for an accurate dosage system based on R units. A dosage system was worked out showing distribution of radium needles or containers for application in the form of moulds, or interstitially, the latter form in plane and volume distribution.

A large number of clinical applications are described, and in separate chapters the underlying physical principles are given.

Sets of tables are given at the end of the book from which the actual dosage to any particular lesion can be worked out with considerable accuracy.

The authors are to be congratulated on the lucidity of the text; the whole subject has been simplified in a most gratifying manner. This is a book which should be in the hands of every radiotherapist or surgeon who uses radium.

GYNÆCOLOGY WITH A SECTION ON FEMALE UROLOGY.—By Lawrence R. Wharton, Ph.B., M.D. Second Edition. 1947. W. B. Saunders Company, Philadelphia and London. Pp. xxi plus 1027, with 479 illustrations. Price, 50s.

THIS is a very recent publication of great value to the practitioner and to the student. The book has several new features. The first that strikes one as an innovation is the distribution of the subject-matter in such sections as:—1. Anatomy and supporting structures. 2. Physiology and functional disturbances. In other words—Anatomy and Applied Anatomy, Physiology and Disturbed Physiology have been dealt with side by side. There is a section on 'Childbirth Injuries'—definitely a new approach to the stereotyped description of prolapses and displacements. In section VI—misplacements of the uterus and fistulas have been dealt with. It is not usual for these subjects to be described in the same chapter. The same remark applies to section XIII which deals with endometriosis, sterility, extra-uterine pregnancy and abortion. What is the common factor amongst these subjects is not easy to comprehend. If yet another example was needed of this unusual grouping one can mention section XV which deals with post-operative care and normal hygiene of healthy women. Female urology has been

dealt with extensively. This really comes under genito-urinary surgery—though not strictly coming under the domain of gynaecology. In fact, chapter LXI is dealt with in obstetrics and most of the other chapters contain subject-matter for a textbook in surgery. This is a special feature of the book and will be appreciated by a practising gynaecologist who may not always have a treatise on surgery available for ready reference.

The subject-matter has been dealt with extensively. In the preface to the second edition the author says 'Significant changes and additions have been made . . . where physiologic or chemotherapeutic problems are under discussion . . .'

'Likewise I have always tried to present both sides of controversial questions'. This the author has done very completely and faithfully.

The text is profusely illustrated. The paper, the printing and the general get-up of the book are in keeping with the renowned publishers.

We have nothing but praise for this book. Practitioners and students of advanced courses of study will all derive considerable benefit from it. Though not a textbook, schools and colleges should keep it in their libraries.

M. S.

THE CIRCULATION IN THE FŒTUS (A SYNOPSIS FOR STUDENTS).—By K. J. Franklin, D.M., F.R.C.P., A. E. Barclay, O.B.E., D.M., F.R.C.P., F.F.R., F.A.C.R., and M. M. L. Prichard, M.A. Blackwell Scientific Publications, Oxford. Pp. iv plus 28. Illustrated. Price, 2s. 6d. Available from Messrs. Macmillan and Company, Limited, London.

The circulation in the foetus, by Kenneth J. Franklin and others, is a useful book for those who are interested in the development and physiology of the foetus and the new-born.

It gives the first-hand information of the research that is carried on in this very difficult but interesting system of the human body. The illustrations are clear and give an otherwise impossible to obtain visual experience of the circulation.

The book is small and well got up and makes easy reading. Researches of this kind only can advance the science of human physiology both before and after birth.

M. S.

THE CHILD BEARING YEARS.—By C. Scott Russell, M.A., F.R.C.S., M.R.C.O.G. 1947. Blackwell Scientific Publications, Oxford. Pp. vii plus 88, with 11 figures. Price, 7s. 6d.

This book written for the benefit of the general public is a small but comprehensive one. It gives information that will be useful for women from their girlhood till the end of the child-bearing years. So a large number of the population will be able to benefit from it.

The book deals both with normal and abnormal conditions. As it covers a large number of subjects, details in many places are not given. Any one interested in a specific subject should be able to get it from the references quoted in the book. The illustrations should help in understanding the physiology at different periods of a woman's life.

The book is handy, print is bold and neat and makes easy reading.

M. S.

THE BIRTH OF A CHILD : OBSTETRIC PROCEDURE IN NORMAL CHILD-BIRTH FOR THOSE WHO ATTEND WOMEN IN LABOUR.—By G. D. Read, M.A., M.D. 1947. William Heinemann (Medical Books) Limited, London. Pp. viii plus 89. Price, 5s.

This book written by the well-known author of the *Revelation of Child-birth*, Dr. Grantly Dick Read, is a very illuminating one. All those who are interested

in obstetrics, specially in the preventive obstetrics, will benefit immensely by this newer light on physiological labour.

Dr. Read's experience and his conviction of a painless labour is shown in the clear decisive way he has represented his view-point. The relationship between pain, fear and tension is very convincing. The part the correct psychology of the attendant can play in a successful painless labour is well explained. He is conscious of the time one has to spend and the trouble one has to take if we want to make the woman forget about the teaching of the past and convince her about the advantages of the present method of thinking.

The size of the book and the good print tempt one to read it. It gives many new ideas for those who are in touch with expectant mothers, and women in labour can practise the teaching in the book and help to obtain a painless happy termination of their pregnancy.

M. S.

ALLERGY IN THEORY AND PRACTICE.—By Robert A. Cooke, M.D., Sc.D., F.A.C.P. W. B. Saunders Company Limited, Philadelphia and London. Pp. 572, Illustrated. Price, 40s.

This book is the work of a pioneer and with the author are associated thirteen collaborators. It is based on the programme of post-graduate instruction in allergy sponsored by the American College of Physicians.

The immunological principles underlying allergy are explained lucidly. Practical details of procedures are ample and include serological subtleties like removal of complement without damaging a weak antibody in the serum.

Chapters on the disorders of the respiratory system are particularly arresting and cover nearly a quarter of the book. The description of Lupus Erythematosus Disseminatus is brief but informative and includes an unusual case beginning with asthma in a child. From this description, however, two queries arise : (1) Is the genito-urinary system 'normal' at all when there are present in the urine a trace of albumin and hyaline cases (p. 318)? (2) Is a disease to be regarded as 'potentially always fatal' if a case has been under observation for twenty-four years (p. 320)?

The book abounds in references. There are long lists of them after every one of the thirty-two chapters and an appendix. Each reference gives the title of the communication or of the book.

The paper, printing and binding are good; only one printing error (p. xi, para 3, line 1) has attracted the reviewer's attention.

All interested in immunology and allergy will do well to have this book in their bookcase.

S. D. S. G.

MATERIA MEDICA FOR NURSES.—By A. M. Crawford, M.D., F.R.F.P.S.G. Sixth Edition. 1947. H. K. Lewis and Company, Limited, London. Pp. vi plus 160. Price, 5s. 6d.

MATERIA MEDICA is a subject most nurses find very interesting and this 6th edition of *Materia Medica for Nurses* is a clearly set out and easily understood textbook. It is up to date with sections on sulphonamides, basal narcotics and penicillin, etc. Any nurse in training or qualified would do well to have this very excellent manual by her always as the author suggests in his preface to the first edition.

P. B.

FOOD AND NUTRITION IN INDIA.—By an Indian Dietarian. 1947. Published by Dr. D. N. Chatterjee, 3/2, College Street, Calcutta. Pp. xiii plus 235. Price, Rs. 6

This book has been written to enlighten laymen on diet and nutrition so that in view of the present food position they may make the best use of available resources. The author starts with the fundamentals of physiology, describing in simple language the digestive



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organs and their functions. The second part of the book covers a wide field and deals with the principles of nutrition, the constituents of food, their uses in the human body, composition of foodstuffs, balanced diet, cooking, etc., all presented in a lucid style so as to make the subject intelligible to an average person. He will find that it is possible to obtain sufficient nutrition from the common foodstuffs that are still available to us, and what is equally important, he may be stimulated to take more interest in increased food production in which we are behind many other countries. The book is based on common sense, is easy to read and should prove useful to busy practitioners too. We would suggest that in the next edition some assorted menus may be given as examples of balanced diet; this may arouse further interest in the subject. One criticism we wish to make is that the author is inclined to put too much emphasis on the value of fasting in diseases. Fasting has undoubtedly its uses, is often overdone and it should have been made clear that prolonged fasting may lead to consequences more serious than the disease itself.

R. N. C.

CLINICAL EXAMINATION OF THE NERVOUS SYSTEM.—By G. H. Monrad-Krohn, M.D. (Oslo), F.R.C.P. (Lond.). Eighth Edition. 1947. H. K. Lewis and Co., London. Pp. xx plus 380 with 126 illustrations. Price, 16s. net

In this little book which is 'not intended to be a book on the diagnosis of nervous disorders', medical men will find much useful information obtained by clinical methods slightly different from those usually found in English medical literature. The author does not agree with the student reading a book before studying cases. One does not agree with the author.

The chapter on the intelligence quotient is not very instructive.

A significant advance is the angiography of the brain. Its utility, however, has been questioned.

The get-up could be better. The price is reasonable.

S. D. S. G.

MEMORANDA ON MEDICAL DISEASES IN TROPICAL AND SUB-TROPICAL AREAS. Eighth Edition. 1946. His Majesty's Stationery Office, London. Pp. 396 with 76 figures and 37 plates. Price, 7s. 6d. net

As memoranda it is an excellent publication. One admired it as a lieutenant and one recommended it to other lieutenants as a lieutenant-colonel. A military medical officer should not be without it. A medical man in civil practice and employment keen on acquainting himself with recent advances in tropical medicine, such as are applicable to daily routines, cannot do better than to obtain a copy. In its 396 pages (including the index) he will find a wealth of information probably not to be found in any other volume of this size. Instances are paludrine, *Plasmodium ovale*, homologous serum jaundice, vector of the jungle yellow fever and anti-rabic serum prophylaxis (anti-rabies is a better term).

As a complete textbook on tropical medicine it should not be judged. It would be better to let the word 'Memoranda' appear again on the binding in the next edition, as it appears on the title page now.

In the memoranda the essential has been separated from the non-essential, truly soldier-wise, for the benefit of the medical man who is already interested in the subject.

An excellent publication.

S. D. S. G.

NUTRITIONAL DISORDERS OF THE NERVOUS SYSTEM.—By John D. Spillane, E. and S. Livingstone Ltd., Edinburgh. Pp. 280. Price, 20s.

Among laboratory workers on nutrition there are many enthusiasts—mostly biochemists—and a few cynics—mostly clinicians. The clinician author of this

monograph holds the scales even between them for the benefit of the reader. The latter will find presented to him in a readable form a critical review of the vitamin-B complex, and up-to-date developments in the morbid anatomy of neurology in general with emphasis on encephalopathy, subacute combined degeneration of the cord, polyneuritis and beri-beri.

The scales are held so even that often the reader wonders if the cynics (or even the enthusiasts) are not right after all.

An appendix of 54 pages gives a record of the author's own cases. There are several pages of references and two indexes, author's and general.

Some accounts are rather spread out more than is necessary. On pages 57 and 58 Kagawas is allowed four consecutive paragraphs. Then there are some obscurities: (1) What exactly is the difference between experimental degeneration of the cord in animals and the sub-acute combined degeneration in man—p. 107? (2) What is meant by 75 lentils per week—p. 179? (3) 'Thirty-five pellagrins, 50 per cent of whom were insane'—p. 38?—There are minor flaws. General conclusions are informative.

The book can be recommended to all interested generally in neurology and particularly in tropical neurology which differs markedly from what one learns from European textbooks on medicine.

The paper, printing and binding are excellent. No printer's errors attract attention. The price is reasonable.

S. D. S. G.

PRACTICAL POINTS IN PENICILLIN TREATMENT.

—By G. E. Beaumont, D.M. (Oxon.), F.R.C.P. (Lond.), and K. N. V. Palmer, M.B. (Cantab.), M.R.C.P. (Lond.). Second Edition. 1947. J. and A. Churchill Limited, London. Pp. 18. Price, 1s. 6d.

This is the second edition of a pamphlet issued last year and reviewed in this journal. New matter covering a page and a half has been introduced.

Two doses of 250,000 units of penicillin in water, one in the morning and one in the evening, have also been recommended, instead of the 3-hourly administration. The rest of the account appears to be the same.

The two categories of diseases, one in which the antibiotic is indicated and the other in which it is not, are given again. Anthrax has not yet been included in the first. It is not included in the second either.

A useful publication.

S. D. S. G.

MENTAL HEALTH.—By John H. Ewen. Edward Arnold and Co., London. Pp. 270. Price, 12s. 6d.

This book gives a concise account of the salient features of mental illness as a whole in an easy narrative. It is written not only for medical students and practitioners but also for those who are interested in sociology, education, child welfare and delinquencies of all sorts.

Under etiology the views of Freud, Jung, Kempf and Adler are compared and contrasted lucidly and amply, in the psychogenic theory of mental disorders. The normal and abnormal solutions of the conflict are discussed.

The bodily causes are not ignored though their inadequacy is pointed out: Drugs are rather indicative of mental instability than causative; auto-intoxication and focal sepsis have been over-rated in the past; and bodily diseases and exhaustions may act as precipitating causes.

The symptomatology conjures up moving pictures: Let the dreamer walk about and act like one awakened and we have the clinical picture of dementia praecox (schizophrenia).

The treatment mentions all up-to-date measures, including the electrical convulsion treatment and narco-analysis. Details of some measures are also available.

The get-up is excellent and price reasonable.

S. D. S. G.

Abstracts from Reports

ANNUAL REPORT OF THE BENGAL BRANCH OF THE BRITISH EMPIRE LEPROSY RELIEF ASSOCIATION FOR THE YEAR 1946

THE main activities of the Bengal Branch consist in carrying out surveys, doing leprosy propaganda, training medical officers in the diagnosis and treatment of leprosy, giving lecture-demonstrations in leprosy to the senior students of the medical institutions of the Province, and inspecting leprosy clinics run by the district boards, etc.

The Bengal Government set up a Committee to report on the future organization of anti-leprosy work in Bengal, with the Director of Public Health as Chairman and Dr. Dharmendra as Secretary. The Committee considered the existing leprosy problem and anti-leprosy work in the Province, and made recommendations for the improvement and the extension of these activities. A summary of the recommendations of the Committee is given below :—

1. The Government should accept the principle that the control of leprosy in the Province is its direct responsibility.

2. For the purpose of anti-leprosy work, the Province of Bengal should be divided into twelve units: (i) Midnapore; (ii) Bankura; (iii) Burdwan and Hooghly; (iv) Birbhum; (v) Calcutta and Howrah; (vi) Murshidabad and Nadia; (vii) 24 Parganas, Jessore and Khulna; (viii) Rajshahi, Malda, Dinajpur, Bogra and Pabna; (ix) Rangpur, Darjeeling and Jalpaiguri; (x) Dacca, Faridpur; (xi) Mymensingh; and (xii) Noakbali, Tippera and Chittagong Hill Tracts.

3. A senior officer of the status of Deputy Director of Public Health should be attached to the Directorate of Public Health, for anti-leprosy work. This officer, who may be designated as Provincial Leprosy Officer, or by some other name, should direct, supervise and co-ordinate the whole leprosy work in the Province. The Provincial Leprosy Officer should be assisted by a District Leprosy Officer in each unit, and a District Leprosy Officer should have under him the necessary number of Assistant Leprosy Officers and Field Assistants.

4. There should be established at least one leprosy institution for infective cases in each unit, with an accommodation for 500 to 1,000 patients. In some units, for example Bankura, Midnapore and Birbhum, there will be needed more than one institution. One of these institutions should play a leading part in teaching and research in the Province.

5. The other activities in the units include an increase in the number of leprosy clinics, organization of village isolation centres, provision for making leprosy surveys, special homes for children, leprosy asylums for crippled and derelict cases, etc.

6. In places where there are no leprosy clinics, the treatment of leprosy should be made available at the Government and District Board hospitals and dispensaries. In addition, the mobile dispensaries in the Province should include in their scope the treatment of persons suffering from leprosy.

7. Leprosy patients, if needing temporary hospitalization for diseases other than leprosy, or acute complications of leprosy, should be admitted into general hospitals, infective cases into infectious wards, and non-infective cases into general wards.

8. The present arrangement whereby teaching in leprosy in the medical institutions is done by the Bengal Branch of the British Empire Leprosy Relief Association, should continue till proper arrangements are made for the teaching to be done by a regular member of the staff with experience and training in leprosy.

The present arrangement whereby post-graduate teaching is done at the Leprosy Department of the School of Tropical Medicine, Calcutta, should continue till the proposed Provincial Leprosarium can undertake it efficiently.

The proposed Provincial Leprosarium should also arrange for the training of non-medical personnel required in anti-leprosy work, e.g. health visitors, nurses and social workers.

9. The existing legal powers for the control of leprosy are not of much practical value, and it is essential that a fresh comprehensive act should be enacted, incorporating the existing and the projected legislation. An indication has been given in this report of the lines on which this legislation should be drafted.

10. Research into the treatment and control of leprosy in an important anti-leprosy activity, and should be given due attention at the proposed Provincial Leprosarium.

11. Anti-leprosy activities in the Province will be successful only if backed by educated and strong public opinion. For this purpose there is a great need for publicity on right lines. The present activities in this direction should be greatly extended, and modern methods of publicity should be utilized.

12. In addition to the medical and public health problems, leprosy creates important social and economic problems. For the success of anti-leprosy work, it is essential that due attention be paid to the solution of these problems. In addition to the provision made for crippled and derelict cases of leprosy, and the children of infective parents, there should be provision to help the needy dependants of the patients, and the able-bodied non-infective patients who may find themselves in difficulty. For the last mentioned purpose, it is desirable to have a special colony for the able-bodied non-infective cases of leprosy, specially cases discharged from the leprosy institutions.

13. Even with the expansion of anti-leprosy work of the Government to the fullest extent, there will be need and scope for work by voluntary and popular organizations. It is recommended that the Government should stimulate and help such voluntary organizations.

14. A start should be made with the appointment of a Provincial Leprosy Officer. Gradually, Leprosy Officers in the units should be appointed starting with the districts affected most, i.e. Bankura, Midnapore, Birbhum and Burdwan. Of the proposed leprosy institutions, a start should be made with at least 4, the Provincial Leprosarium near Calcutta, 1 each for Bankura and Midnapore, and 1 for the Dacca Division. The aim should be to complete the programme outlined in this report in the next 10 years, at the expiry of which the progress of the work should be reviewed and further programme outlined.

The Bengal Government has accepted the report and has already appointed an Assistant Director of Public Health for Leprosy. Two leprosy institutions with provisions for 500 cases each are expected to start working shortly.

Between the years 1932-37, Dr. B. N. Ghosh, Leprosy Officer of the Bengal Branch, British Empire Leprosy Relief Association, carried out leprosy surveys amongst beggars, school students, members of the Police Force, and workers of certain industrial concerns in Calcutta. He examined 3,000 beggars and detected 376 cases of leprosy, an incidence of over 12 per cent. Amongst the 25,000 students of High English Schools, he detected 109 cases of leprosy, an incidence of 0.4 per cent. In 13,000 students of Primary Schools, 135 cases were found, giving an incidence of 1 per cent. In over 5,000 members of the Calcutta Police, 47 cases of leprosy were detected, giving an incidence of 0.92 per cent. In over 9,000 workers of three industrial concerns, 150 cases of leprosy were found, giving an incidence of 1.65 per cent. It may be roughly said that the incidence of the disease in Calcutta as a whole is about 0.5 per cent.

The two clinics run by the Premananda Leper Dispensaries deal with over 2,000 persons annually, including cases amongst both the general population and the beggars of the city. Their report for the year 1945 shows that during the year a total number of 2,436 cases were treated from amongst the general public. Of this 1,172 were 'new' cases registered during the year. Of the 'new' cases, 864 are reported to have come from inside the city, and the remaining from outside the city.

During the 10 years 1936-45 over 8,000 permanent residents of Calcutta have attended the Premananda Leper Clinics and the Leprosy Clinic of the School of Tropical Medicine, for diagnosis and treatment of leprosy. An analysis of these persons according to the wards in Calcutta is given.

Correspondence

AN UNUSUAL CASE OF SUPPRESSION OF URINE

SIR,—Reference to above article published in the *I.M.G.*, August 1947, p. 472.

It is usually understood by the term 'suppression of urine' as the failure of the kidneys to secrete urine. The case under report is one of retention of urine, i.e. the failure of a full bladder to empty itself. Can you kindly clarify the position with regard to usage of these terms?

Yours truly,

B. S. RAMAMURTHI, M.S.
F.R.C.S. (Edin.).

43, HARRIS ROAD,
MADRAS.

[It is regretted that the above correction escaped notice.—EDITOR, *I.M.G.*]

PARKINSONISM IN TYPHOID FEVER

SIR,—With reference to the report in your journal of March 1947 of a case of typhoid fever, complicated by Parkinsonism, I wish to draw your attention to the following points:—

To me, the case looks one of typhoid with signs of meningeal irritation, the points in favour of the latter being

1. Muscular rigidity,
2. Positive Kernig's and Brudzinski's signs, and
3. C.S.F. findings, namely increased pressure, increased proteins, i.e. 1.2 per cent, complete absence of sugar and the presence of a few monocytes.

The cause of meningeal irritation is not quite obvious here. It cannot be the simple case of meningism, as there is a definite increase in the C.S.F. proteins, complete absence of sugar, and the presence of some cellular reaction though the clinical course of the case very much favours this diagnosis. In view of the otitis media or mastoiditis complicating the case, we have to think of: (1) Septic meningitis which is ruled out in this case by the absence of a marked polymorphonuclear cell reaction and growth in culture; (2) 'Serous' meningitis which is difficult to exclude in this case (granting the existence of such a pathological entity).

Though mentioned as a rather rare complication and as being attended with grave prognosis, typhoid meningitis has got to be thought of. The issue could have been settled if only the C.S.F. has been collected straight into ox-bile medium and cultured for *Eberthella typhosa*.

The total absence of sugar in the C.S.F. militates against a diagnosis of encephalitis the aid of which the author invokes in this connection. I wish the author had been a little more clear about the nature of the inflammation in question.

In this connection, I do not think the report of a similar case from the Government General Hospital,

Madras, will be out of place. K., about 25 years old, was admitted in the Enteric Ward under Dr. A. Sreenivasan, M.R.C.P. (London), Honorary Physician, for continuous fever of one week's duration. On admission the patient was very toxic and delirious. His temperature was 101°F., pulse 90 per minute, regular with good volume and tension. His tongue was coated all over except in the tip and edges. There was no distension of the abdomen or palpable liver or spleen. The respiratory and cardio-vascular systems were normal. He had almost cadaveric rigidity of the whole body musculature and it was somewhat of the 'cogwheel' type, Kernig's and Brudzinski's signs were positive. There were fine tremors in both the hands and they were present even during sleep. They were not of the 'intention' variety. The knee and ankle jerks were slightly exaggerated and the plantar response was flexor on both sides. Both the pupils were normal in size, regular, equal, reacted to light and convergence.

Investigations:—

Urine: Nil abnormal.

Blood: No malarial parasite detected in a smear.

Total W.B.C. count 10,800 per c.mm.

Polymorphs 76 per cent, lymphocytes 21 per cent, monocytes 3 per cent.

Lumbar puncture revealed clear fluid, not under tension. Queckenstedt's sign was positive. There were no cells in the fluid and there was no growth in culture (culture for enteric group was unfortunately not put up due to oversight). Total proteins 60 mgm. per cent. Globulin present, sugar 50 mgm. per cent, calorides 600 mgm. per cent. The lumbar puncture was repeated 2 days later for getting the C.S.F. for culture for enteric group. As ill luck would have it, the fluid was blood-stained due to trauma. VIDAL REACTION: Agglutination with *B. typhosus* 1 in 200 positive and with *B. paratyphoid A* and *B* negative. BLOOD CULTURE: *E. typhosus* was isolated.

The patient was put on a simple diaphoretic mixture with tincture stramonium 45 minims per day. On the 5th day of the treatment tincture stramonium was stopped, as there was no clinical improvement. The temperature touched normal on the 8th day of admission. The patient's general condition improved and along with it the rigidity and tremors also. The patient was able to answer questions quite well. The rigidity and tremors were totally absent on the 14th day after admission.

This case is very much akin to the one in question, except for the presence of tremors. Therefore, I again feel the same way here also. Tremors are not uncommon in cases of typhoid fever with meningeal irritation. The rapid and complete recovery, lowering of the C.S.F. chlorides, absence of growth in culture and absence of cellular reaction strongly favour the diagnosis of meningism in this case, the only point against this diagnosis being a slight increase in the C.S.F. proteins with presence of globulin.

I tender my grateful thanks to Dr. A. Sreenivasan, M.R.C.P. (London), for kindly going through this communication and also the Superintendent, General Hospital, and the Surgeon-General with the Government of Madras, for granting me permission to report the case from the Government General Hospital, Madras.

K. BHASKARAN,
M.B., B.S.

GOVERNMENT GENERAL HOSPITAL,
MADRAS.

SPECIFIC FOR ORIENTAL SORE (DERMAL LEISHMANIASIS)

SIR,—After many baffling efforts with injections and surgical interference I found local application of 1.5 per cent sodium antimony tartrate solution in gauze with daily renewal completely successful, satisfying all the conditions of a specific. Striking on the toxicity that is 1.5 per cent was the crucial thing, tipping the balance in favour of cells without irritation. Cases with heavy secondary infections were washed with 1 in 1,000 aqueous

acridavine lotion before application of gauze soaked in 1.5 per cent sodium antimony tartrate solution.

Yours sincerely,
N. Z. KHAN, M.B.
(MAJOR, I.M.S.-ex).

58B, PARK STREET,
P. O. CIRCUS,
CALCUTTA,
24th December, 1947.

[Sodium antimony tartrate and tartar emetic have been used from 1 to 4 per cent ointment for the treatment of oriental sore with considerable success. Some years ago a report was published from Delhi about this in this journal.

This letter would be useful if accompanied by convincing clinical data.—P. S. G.]

Any Questions

PENICILLIN IN WAX AND OIL

SIR,—Penicillin G in wax and oil according to Romansky formula contains 4.8 per cent wax. It liquefies at about 114°F. My questions are the following:—

1. Is the wax solid at body temperature when injected intramuscularly?
2. How the wax is absorbed from the muscle?
3. If not absorbed, can foreign body reaction or septic cellulitis in a devitalized patient be produced sooner or later?

Yours truly,
P. GHOSAL.

7, BHUT NATH HALDER
LANE, SIBPUR, HOWRAH.

1. Penicillin-oil-beeswax suspension ('P.O.B.') is sufficiently fluid at blood heat and the penicillin can be distributed uniformly by thorough shaking at that temperature.

2. Absorption of wax in the 'P.O.B.', if at all, is very slow.

3. The portion of wax not absorbed is encapsuled; the chance of septic cellulitis at the site of injection is, however, very remote unless the injection is repeated at the same site, and organisms permitted to enter through the skin puncture. There is no evidence to suggest that the local tissues get devitalized as a result of the wax forming a depot at the site of injection.

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—B. M.]

SMALLPOX WITH MALARIA

SIR,—Is it judicious to administer quinine to patients who, having attacks of malaria fever, are down with smallpox?

Is there any contra-indication of its (quinine) giving intramuscularly, 10 grains per dose, one or two injections

on the 1st or 2nd day of the onset of the disease, i.e. before coming out of the rash, if malaria is suspected?

Yours faithfully,
S. C. CHAKRABARTI, L.M.F.

M. O., NEPAL GOVT.
RAILWAY, BIRGUNJ,
RAXAUL P. O.

[Yes.

No contra-indication is known. But why intramuscularly and not by mouth?—J. C. G.]

VACCINATION AGAINST SMALLPOX

SIR,—In March 1947, a local vernacular paper reported that "several famous British doctors" had earnestly requested the Indian people and the Provincial Governments to eschew vaccination against smallpox, altogether, for the practice had done 'incalculable harm' to the British people. These doctors appealed to all concerned not to repeat the mistake made elsewhere and recommended the perusal of 'The Vaccination Problem' by one J. B. Swan.

Recently again (i.e. in the last week of December), an article has appeared in the vernacular press claiming that the practice of vaccination is 'unscientific, unnecessary and dangerous'.

At about the same time, during Conference Week in Bombay, a local paper there published the following letter—

'Doctor's attention

It is reported that nearly 740 delegates from India and Pakistan are meeting in Bombay for the All-India Medical Conference. Here is something to which the attention of all these Indian doctors is earnestly invited. British doctors have recently addressed a petition to the Legislative Assemblies of all the Provinces in India. An extract from that letter follows:—

"We, in England, after suffering bitterly for more than a century from the failure and the evil effects of vaccination, have, as the result of a hard struggle against prejudice, selfishness and the greed of vested interests, at last succeeded in freeing ourselves from the compulsory imposition of this practice and we now desire that our fellowmen in India shall also be free. . . . In this matter we feel we have a particular moral responsibility towards India, because it was the British Government in India who introduced vaccination into that country. Convinced that its introduction was a mistake, as has been amply proved by results, we now wish to take this opportunity to write you without wasting a hundred . . . did, to abolish compulsory vaccination in India. You will thus bring your country into line not only with England but also with other European countries, some of the states of North America and with Australia and New Zealand. Vaccination does not protect from smallpox, nor prevent deaths from the disease. Vaccination is a frequent cause of ill health and even of death. The real causes of smallpox are poverty, insanitary conditions and wrong feeding. In view of these facts we ask the Government to repeal the compulsory vaccination laws and to transfer the money and effort now less than wasted on vaccination and revaccination, to the increased support of national schemes of sanitary and social reform which alone can lead, not only to the abolition of smallpox but to the ultimate abolition of all the grosser forms of Zymotic disease. . . ."

—SCRUTATOR.

RANCHHODLAL DISPENSARY,
PANCHKUWA, AHMEDABAD,
COLABA.
6th January, 1948.

Yours faithfully,
K. A. SHAH.

[Such propaganda against vaccination for smallpox have appeared from time to time. They however produce no facts which would make them worthy of serious attention.—R. B. L.]

Service Notes

APPOINTMENTS AND TRANSFERS

THE following officers of the late I.M.S. were appointed by the Secretary of State to the I.M.S. (Civil) with effect from the dates noted against their names :—

Sind

Major E. M. Wallace. Dated 11th July, 1946.

Punjab

Major S. G. O'Neill. Dated 7th October, 1946.

Orissa

Lieutenant-Colonel B. N. Hajra. Dated 10th November, 1946.

The following officers are permanently transferred to the late I.M.S. (Civil) with effect from the dates noted against their names :—

Ministry of External Affairs and Commonwealth Relations and States

Major C. H. Bliss. Dated 14th February, 1947.

Major G. R. C. Palmer. Dated 13th March, 1947.

Ministry of Health

Major N. Jungalwalla. Dated 8th August, 1946.

Lieutenant-Colonel T. B. Pahlajani. Dated 1st January, 1947.

Lieutenant-Colonel W. T. Taylor. Dated 1st January, 1947.

Major B. A. Porritt. Dated 1st January, 1947.

Major H. B. Wright. Dated 1st January, 1947.

Major G. H. K. Niazi. Dated 1st January, 1947.

Sind

Major S. A. Hassan. Dated 22nd May, 1947.

Bengal

Major C. H. Dhala. Dated 22nd February, 1947.

Punjab

Major L. U. Kam. Dated 3rd February, 1947.

Major B. H. Sayeed. Dated 18th April, 1947.

Bihar

Major R. B. Davis. Dated 18th June, 1947.

Major A. S. Sen is appointed Assistant Director-General of Health Services (Stores) temporarily for 1 year with effect from the 2nd January, 1948.

LEAVE

Lieutenant-Colonel W. T. Taylor, lately Additional Deputy Director-General, Indian Medical Service (Stores), is granted combined leave preparatory to retirement for a period of 2 years and 4 months, viz. leave on average pay for 8 months and half-average pay for the balance, with effect from the 6th April, 1947.

Lieutenant-Colonel H. W. Mulligan, formerly Director, Central Research Institute, Kasauli, is granted leave preparatory to retirement, on half-average pay for 1 year and 4 months in continuation of the combined leave for 12 months sanctioned in previous Notification dated the 29th April, 1947.

Major J. H. Gorman, lately Port Health Officer, Bombay, is granted combined leave ex-India, preparatory to retirement, for 28 months consisting of leave on average pay for 8 months and the balance on half-average pay, with effect from the 31st May, 1947.

In supersession of previous Notification dated the 8th December, 1947, Lieutenant-Colonel D. MacD. Fraser, c.i.e., lately Director of Health Services, Delhi Province, is granted combined leave for 2 years and 4 months, namely, war concession leave on average pay

for 1 month, leave on average pay for 8 months and leave on half-average pay for 1 year and 7 months preparatory to retirement, with effect from the 15th August, 1947.

Lieutenant-General R. Hay, c.i.e., lately Director-General, Indian Medical Service, is granted leave on average pay preparatory to retirement for 6 months and 27 days, with effect from the 15th August, 1947.

Major C. J. Hassett, m.b.e., lately Civil Surgeon, New Delhi, is granted combined leave preparatory to retirement for 2 years and 4 months, namely, war concession leave for 1 week, leave on average pay for 8 months and leave on half-average pay for the balance, with effect from the 15th August, 1947.

Lieutenant-Colonel E. T. N. Taylor, c.i.e., lately Officer on Special Duty in the Office of the Director-General of Health Services, is granted combined leave preparatory to retirement for 2 years and 7 days, namely, war concession leave on average pay for 1 month and 16 days, leave on average pay for 8 months and leave on half-average pay for 1 year, 2 months and 21 days, with effect from the 1st November, 1947.

PROMOTIONS

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captains to be Majors

R. Raghavan. Dated 2nd February, 1946.

Profulla Chandra Sen. Dated 5th August, 1946.

Lieutenants to be Captains

Chuni Lal Sood. Dated 1st October, 1944.

S. D. Sharma. Dated 2nd November, 1944.

L. V. A. Narayanan. Dated 4th December, 1944.

C. T. G. Tilak. Dated 11th May, 1945.

K. R. Pande. Dated 19th March, 1946.

M. G. G. Nirhali. Dated 18th April, 1946.

B. R. Rao. Dated 10th May, 1946.

K. Thimmappaia. Dated 14th May, 1946.

M. P. Srivastava. Dated 6th July, 1946.

S. K. Sen. Dated 24th August, 1946.

(Miss) K. S. Phatak. Dated 26th August, 1946.

B. N. Sinha. Dated 11th September, 1946.

R. C. Sinha. Dated 22nd October, 1946.

I. Singh. Dated 21st November, 1946.

J. N. Roy. Dated 21st November, 1946.

D. C. Sen. Dated 1st December, 1946.

N. C. Singhal. Dated 4th December, 1946.

J. M. Vyas. Dated 18th December, 1946.

D. B. Sen. Dated 21st December, 1946.

H. K. Saha. Dated 21st December, 1946.

(Miss) B. Singh. Dated 7th January, 1947.

B. M. Stevenson. Dated 13th January, 1947.

Kamala Sharan. Dated 20th January, 1947.

R. A. Singh. Dated 26th January, 1947.

R. M. Sinha. Dated 26th January, 1947.

R. J. Watwe. Dated 27th January, 1947.

Jagjit Singh. Dated 12th February, 1947.

Sukumar Roy. Dated 28th February, 1947.

A. C. Roy. Dated 29th February, 1947.

A. D. Rajkhowa. Dated 6th March, 1947.

N. C. Rath. Dated 11th March, 1947.

D. K. Srivastava. Dated 15th March, 1947.

S. C. Sen. Dated 15th March, 1947.

M. S. Rainu. Dated 1st April, 1947.

R. K. Roy. Dated 10th April, 1947.

K. D. Sarkar. Dated 2nd May, 1947.

H. Solomon. Dated 9th May, 1947.

K. H. Singhal. Dated 11th May, 1947.

Amar Singh Takkar. Dated 12th May, 1947.

R. S. Rao. Dated 1st June, 1947.

B. Vyas. Dated 1st June, 1947.

G. C. Sharma. Dated 1st June, 1947.

S. J. Sahapodder. Dated 22nd June, 1947.

R. B. Patel. Dated 6th July, 1947.

V. V. Shevade. Dated 9th July, 1947.

R. I. Rangachar. Dated 22nd July, 1947.

V. R. Phatak. Dated 27th July, 1947.

H. R. Tandon. Dated 11th August, 1947.

(GENERAL SERVICE)

G. C. Banerjee. Dated 25th November, 1946.
 V. V. Achwal. Dated 26th November, 1946.
 T. H. Acharya. Dated 13th December, 1946.
 J. P. Issar. Dated 21st December, 1946.
 M. S. Bhattiwale. Dated 30th December, 1946.
 D. K. Mohanty. Dated 11th June, 1947.

RETIREMENTS

Lieutenant-Colonel N. D. Puri. Dated 16th August, 1946.
 Lieutenant-Colonel R. B. Bharucha. Dated 16th January, 1947.
 Lieutenant-Colonel G. R. Oberai. Dated 6th April, 1947.
 Colonel M. S. Joshi. Dated 14th October, 1947.

RELINQUISHMENTS

The undermentioned officer is permitted to relinquish his commission on release from army service, and is granted the honorary rank of Lieutenant-Colonel. His services were replaced at the disposal of the Government of Madras, with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Lieutenant-Colonel Rama Krishna Chettur. Dated 3rd July, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service, and is granted the honorary rank of Squadron Leader :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Major Nariman Hormusji Oonvala. Dated 8th August, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service, and is granted the honorary rank of Major. His services were replaced at the disposal of Government of Madras, with effect from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Major G. Raman. Dated 4th June, 1946.

The undermentioned officer is permitted to relinquish his commission on release from army service, and is granted the honorary rank of Major. His services have been replaced at the disposal of the Residency Surgeon, Bangalore, from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Ty. Major Krishna Rao. Dated 1st July, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service, and are granted the honorary rank of Major :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Major Melbat Achuthan Nair. Dated 18th December, 1946.

Captain Kolluri Madhusudan Rao. Dated 14th August, 1947.

The undermentioned officer is permitted to relinquish his commission on release from army service, and is granted the honorary rank of Captain. His services have been replaced at the disposal of the Government of Bihar from the date specified :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commission)

Captain B. K. Aikat. Dated 6th June, 1946.

The undermentioned officers are permitted to relinquish their commissions on release from army service, and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS
 (Emergency Commissions)

Captain Clifford Owen Bedeli. Dated 7th October, 1946.

Captain Mohd. Yehya. Dated 3rd December, 1946.

Captain Inayat Ullah. Dated 17th June, 1947.

Captain Kshirode Behari Das. Dated 9th July, 1947.

Captain Gerald Francis Perry. Dated 15th July, 1947.

Captain Swadesh Bhagat Rajpal. Dated 21st July, 1947.

Captain Gummadi Seshiah. Dated 1st August, 1947.

The undermentioned officers are permitted to relinquish their commissions on release from army service, and are granted the honorary rank of Captain :—

INDIAN LAND FORCES—INDIAN MEDICAL SERVICE
 SECONDED TO THE INDIAN ARMY MEDICAL CORPS

(Emergency Commissions)

Captain P. K. Sankaran Nair. Dated 6th May, 1946.

Captain G. P. K. I. Venkataraman. Dated 9th May, 1946.

Captain A. S. L. Narasimham. Dated 23rd September, 1946.

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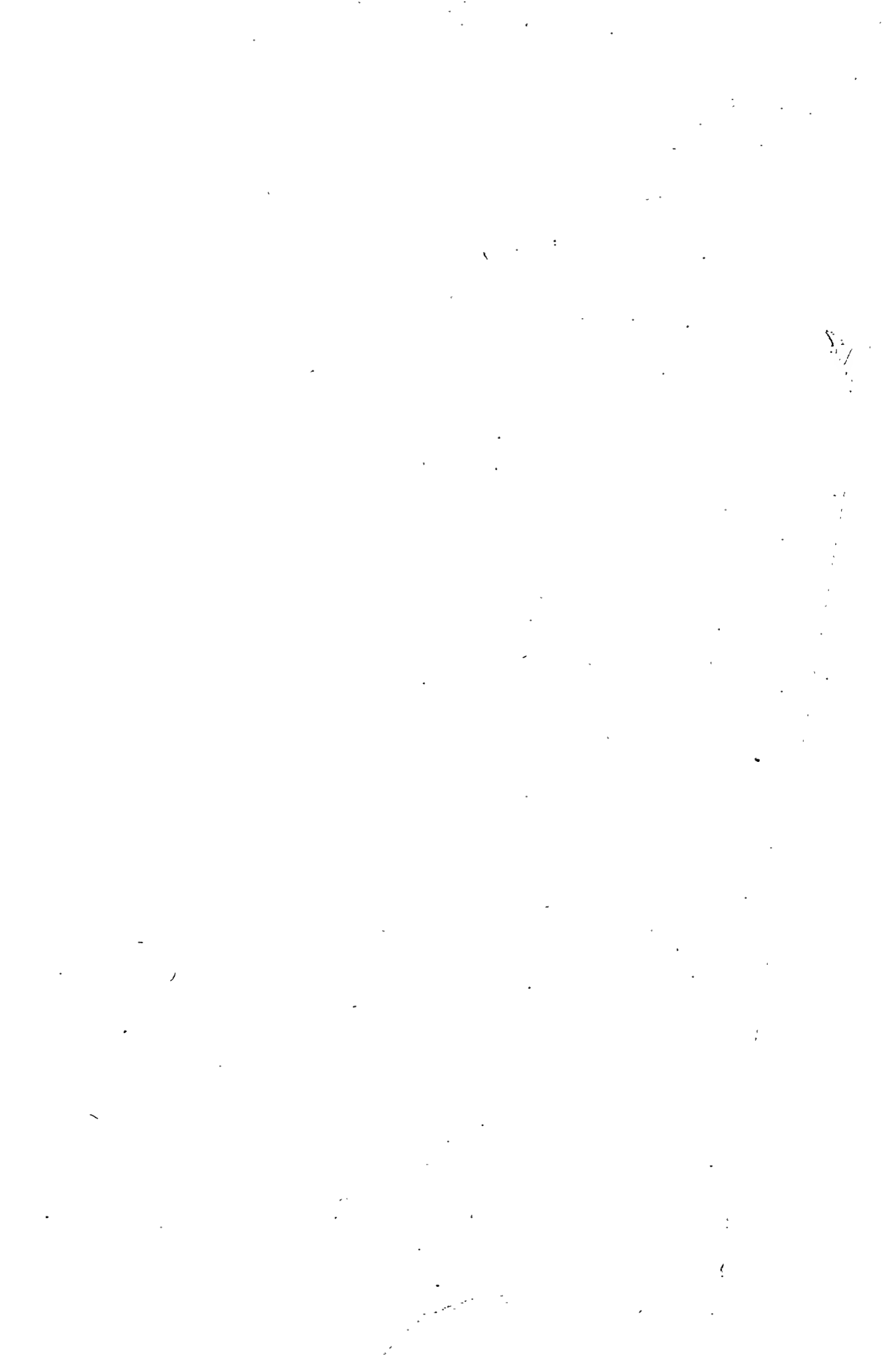
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